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THE ARCHITECTURAL FORUM

VOLUME XXXII NUMBER 3

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ALBERT J. MacDONALD, Editor

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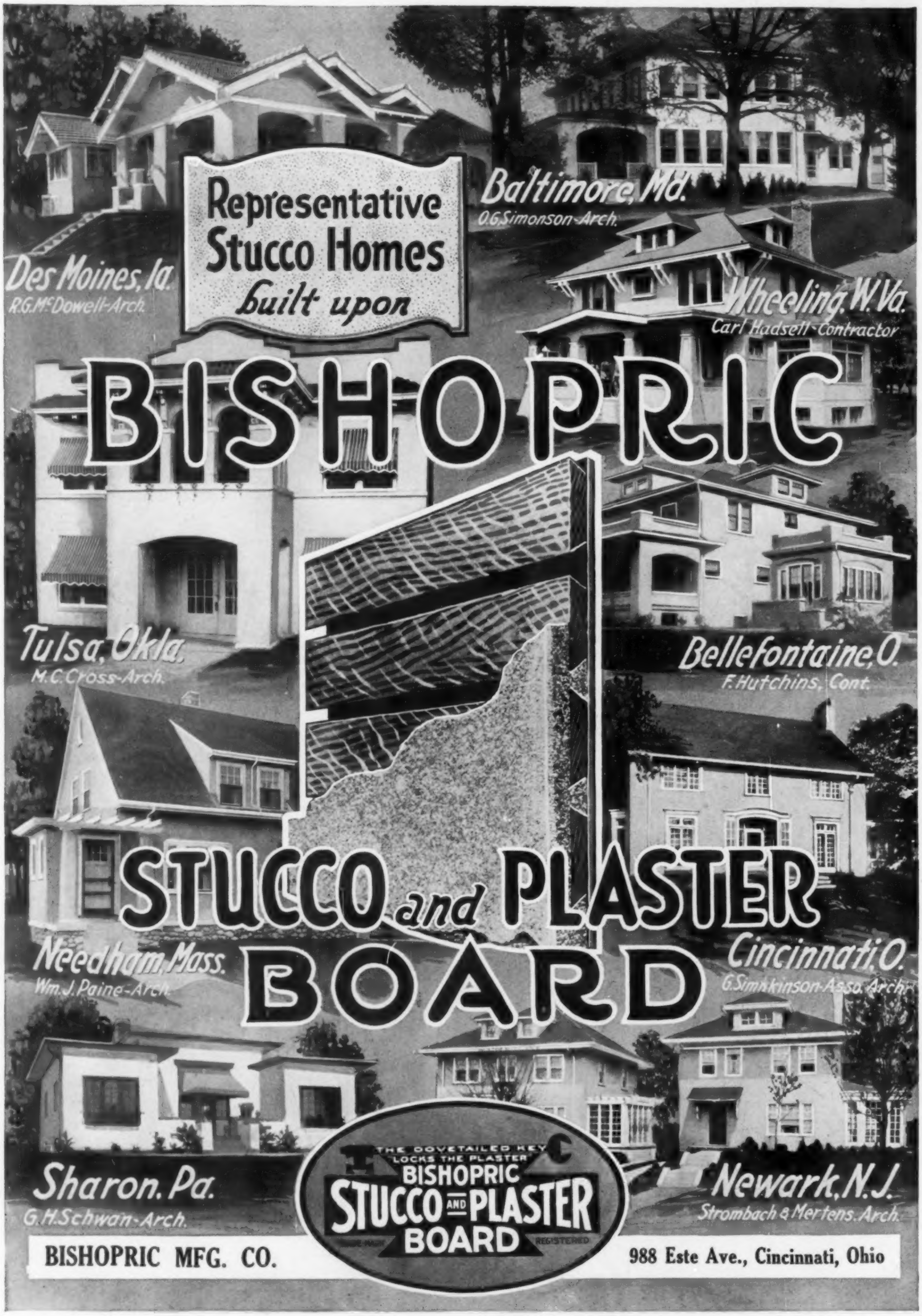
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THE EDITORS FORUM

ITALIAN AND FRENCH DETAILS

THE publication of the measured drawings of Italian and French Renaissance details announced a few months ago begins in this issue with two interesting examples from Italy. They will appear in every other subsequent issue. The measurements for these drawings were secured by William D. Foster following the demobilization of the A. E. F. Art Training Center at Bellevue, France, where he acted as Assistant Adjutant Historian. The drawings are examples of excellent draftsmanship, and they have been reproduced carefully to retain the character of the original line. They are, furthermore, shown at actual scale to make them of the greatest value.

JANUARY BUILDING FIGURES

THE great volume of construction begun in the closing months of 1919 — a brief résumé of which was published in our January issue — is being followed consistently into 1920, and from reports now available for the first month of this year it is evident that the prediction of $3,000,000,000 of construction in 1920 will be reached.

The American Contractor states that the total volume of building permits for January in 193 cities is $117,747,298, showing a gain of more than 440 per cent over the corresponding period of 1919, the total for the same cities in January, 1919, being $21,732,529. Cost of construction has greatly increased in the year, but considering this, it is evident that present activity in building is far in access of normal. It indicates the great necessity that exists on all sides for buildings, because this amount of construction has been undertaken in the face of obstacles that at any other time would be overpowering. Lack of investment money, shortage of labor and material supplies are even now holding back a great amount of building for which there is immediate need, and every effort should be made in the building industry to proceed with present construction on as economical a basis as possible so that our resources may be extended over as large a field as possible.

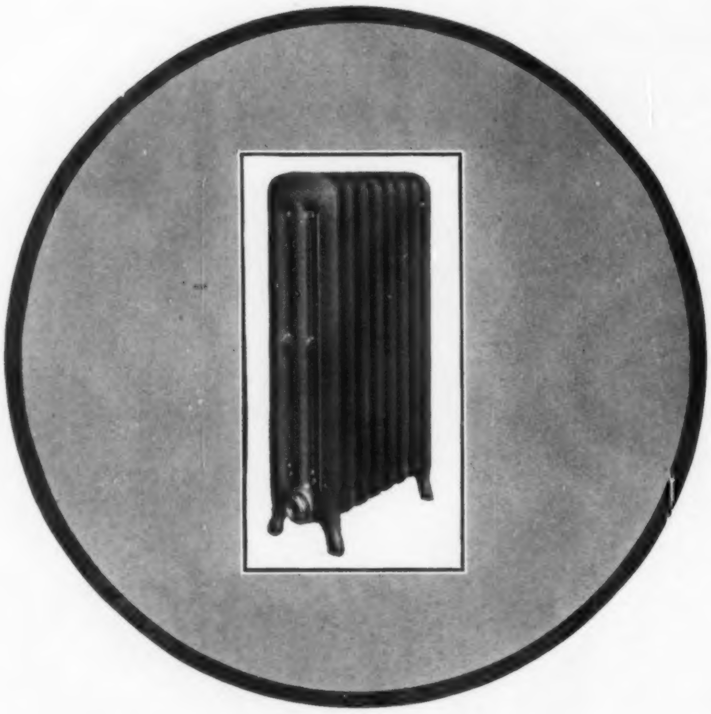
STANDARD SIZE FOR BRICK

THE interest the Government displayed during the war in the larger industries of the country has been instrumental in making clear to manufacturer and consumer alike the value of standardization, practiced to a reasonable degree. There is evident here and there an impression that standardization will solve all difficulties, and that everybody and everything should immediately submit to its dictation. This would be retrogression surely, but there is a happy medium that will bring large benefits and to which all can subscribe. This is especially true in the matter of sizes of units of building materials used throughout the country in substantially the same manner. Brick is such a unit that should be standard, but heretofore different manufacturing conditions have prevailed, and as many different sizes have resulted. It will interest architects to know that at the Convention of the Common Brick Manufacturers' Association of America, held in Columbus, Ohio, on February 16, 17 and 18, it was unanimously voted to adopt the size $2\frac{1}{4}$ by $3\frac{3}{4}$ by 8 inches as the standard. Committee C-3 of the American Society for Testing Materials, also meeting in Columbus, was asked to change its tentative brick size to the same, on which it agreed. This size had previously been adopted by the American Face Brick Association and the National Brick Manufacturers' Association, so it may now be considered a national standard. There are several reasons for the adoption of this size ; in the matter of bonding and pattern work, considering a $\frac{1}{2}$-inch joint most usual, two headers plus a joint equal the length of a stretcher, so that any bond may be used without difficulty. Also, in the thickness of walls, it will now be possible for building codes to specify wall thicknesses without fractions.

ROTCH TRAVELING SCHOLARSHIP

ON account of war conditions this scholarship has not been awarded for two years, but will be resumed this year. Preliminary examinations will be held at the office of the Secretary, C. H. Blackall, 20 Beacon street, Boston, on Monday and Tuesday, April 12 and 13, 1920, at 9 A.M., to be followed by the sketch for Competition in Design on Saturday, April 17, 1920, at the Boston Architectural Club, 16 Somerset street. The successful candidate will receive annually for two years an amount which it is hoped will not be less than $1,400 per year, to be expended in foreign travel and study. Candidates must be under thirty-two years of age and must have been engaged in professional work for two years in the employ of a practising architect residing in Massachusetts. Holders of a degree from a recognized architectural school may present their certificates in lieu of the preliminary examinations. Candidates are requested to register at the office of the Secretary as soon before the examinations as practicable, so that accommodations may be arranged.

United States Radiators



Getting around to the subject of radiators——

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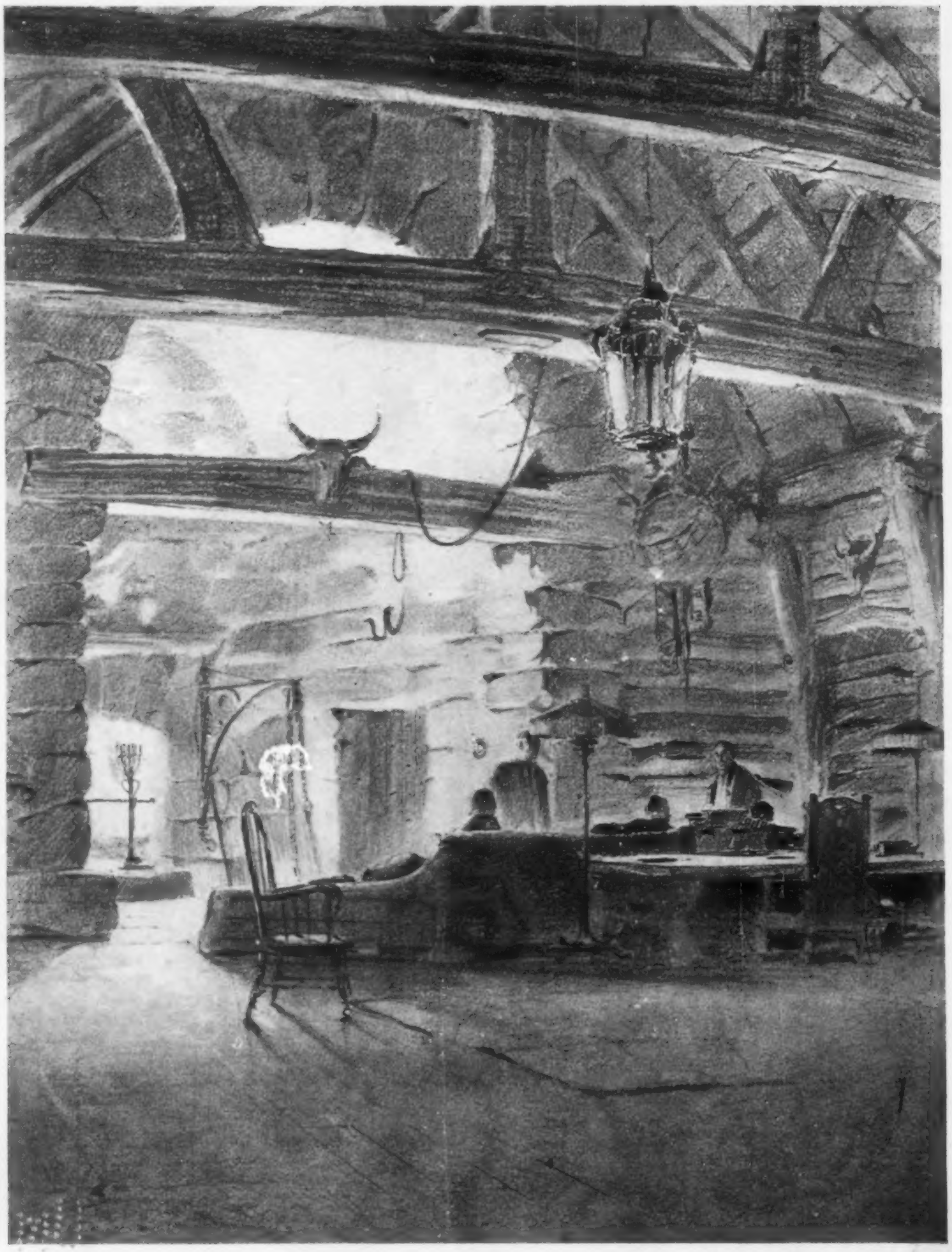

PENCIL SKETCH OF AN INTERIOR
BY O. R. EGGERS
John Russell Pope, Architect

The
ARCHITECTURAL
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VOLUME XXXII MARCH 1920 NUMBER 3

Domestic Architecture of California

ILLUSTRATING THE INFLUENCE OF THE SPANISH AND ITALIAN RENAISSANCE
PART I

By WILLIAM WINTHROP KENT

ARCHITECTURE in California has for the layman or the student two periods worth consideration, namely, its earlier manifestations in Spanish Colonial and the modern development of that and of the Italian Renaissance.

Of the earlier examples there are fortunately remaining the ruined and restored Spanish missions, ranch buildings, simple dwellings and a few especially instructive public buildings.

The ecclesiastical buildings show that it was to religious architecture that the Spanish and Spanish-Mexican settlers gave special consideration in California, as was also the case in the Southwest generally and Mexico.

The missions are still in condition to be easily studied and are in the general style of Spanish Renaissance, which we call Spanish Colonial, verging often on Baroque, with traces of Moorish influence.

The familiar type is that of a church front with one or two towers, often, as at Santa Barbara and San Luis Rey, flanked by an arcade. The entrance is generally round arched, and the usual cloister or *patio* is surrounded by arcades of round arches. Occasionally the square headed opening with column, or pier and lintel, is seen on the exterior, as at San Luis Obispo and San Antonio de Pala, but generally the round arch prevails. The church is often barrel vaulted and at San Juan Capistrano it was roofed by domes; while the towers, generally heavy and low, with chamfered corners, are marked by string courses into stories. These towers have usually the round arch and a domed top, while others are mere belfry walls or arched piers with tops in curved, capped lines.

In private dwellings the court or *patio* is a common feature in both town and country, and is sometimes open on one side; but the column and lintel in the court and the square headed window in the outer wall take the place of the more costly round or Romanesque arch which the *padres* used in the missions.

In most buildings, public or private, *adobe* or clay-mud bricks, sun dried, were used in the walls, which were often made three or four feet thick and sometimes thicker. The roof timbers were covered with brush, or tule or bulrush stalks, and on this were laid the curved red tiles of dull variegated tones such as are used in France, Italy and Spain to-day.

In many of the missions and the better class of other constructions the walls and piers were made

San Luis Rey Mission

Santa Barbara Mission

House at Sierra Madra
R. D. Farquhar, Architect

House at Altadena
Reginald D. Johnson, Architect

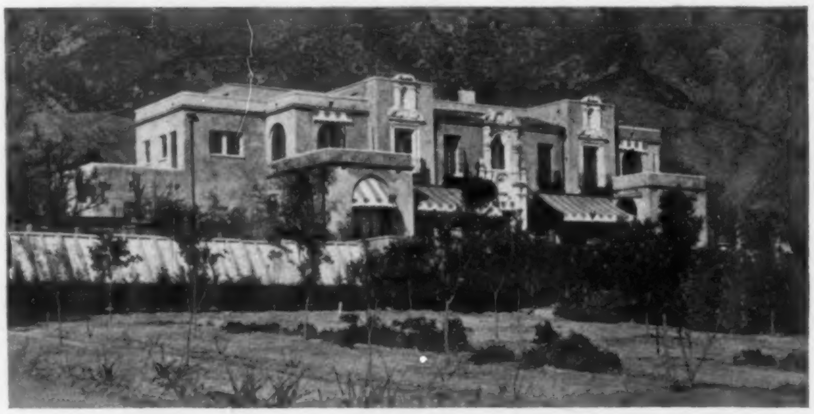
of red tilelike bricks, and tiled floors were commonly laid in rooms and on cloistered walks.

In all this early work, therefore, we see very direct, simple and beautiful methods employed to get chiefly practical results, comparatively little attention being given to ornamental detail or mouldings, except in the missions, where often the Indian workman was, as at Capistrano, Santa Barbara, Carmel and elsewhere, allowed to invent the designs for architraves, door-heads and general ornament. The result of this simple, sturdy building was that the walls rarely, if ever, had too many or too large doors and windows, but only such as the means and necessities of the builders permitted. Therefore, while the eaves projected sometimes but slightly, the bulky buttresses on side and corner always reinforced a blank wall of sufficient extent to receive beautiful gradations of shadow, which wall also set off the darkness of an opening by a broad, sunlighted surface. Also the troweled plastering of the *adobe* wall caught the sun and shadow on its slightly wavy and roughened surface, somewhat as the paper of an old Japanese print took unevenly on its surface of beautiful texture the inimitable tones of color from the block.

Later art, the art that succeeded that of the Spanish Colonial structures, gradually lost not only the appreciation of the values and beauty of blank wall surfaces but finally the very texture of the wall itself, because the modern man in church and house building often demanded more windows and insisted on a mechanically straight and hard wall surface, even if plastered. So in a similar way by the use of inferior and less lovingly chosen paper and colors has the Japanese workman, trying to please Western taste, lost the beauty of the old *ukiyoye* print that Hokusai and Hiroshige demanded and got.

This unavoidable descent from a plane of simple, honest and picturesque architecture to the banality of certain buildings that Californians and newcomers erected later, was a misfortune from which the state is only just beginning to recover.

It is hard to give the exact date when this recovery began, this modern tendency toward more


House of L. C. Brand, Esq., at Altadena
A. D. Hill and J. S. Burley, Associated Architects

House of Tod Ford, Jr., Esq., at Pasadena
Reginald D. Johnson, Architect

MAIN ENTRANCE DETAIL, HOUSE OF HERBERT COPPELL, ESQ., PASADENA, CAL.
BERTRAM GROSVENOR GOODHUE, ARCHITECT

classic simplicity and more honest building, but it is safe to credit its beginning to the effect of the World's Fair in Chicago, which led to later ambitious and successful attempts in the Buffalo, St. Louis, San Francisco and San Diego Expositions to improve not only commercial but architectural conditions.

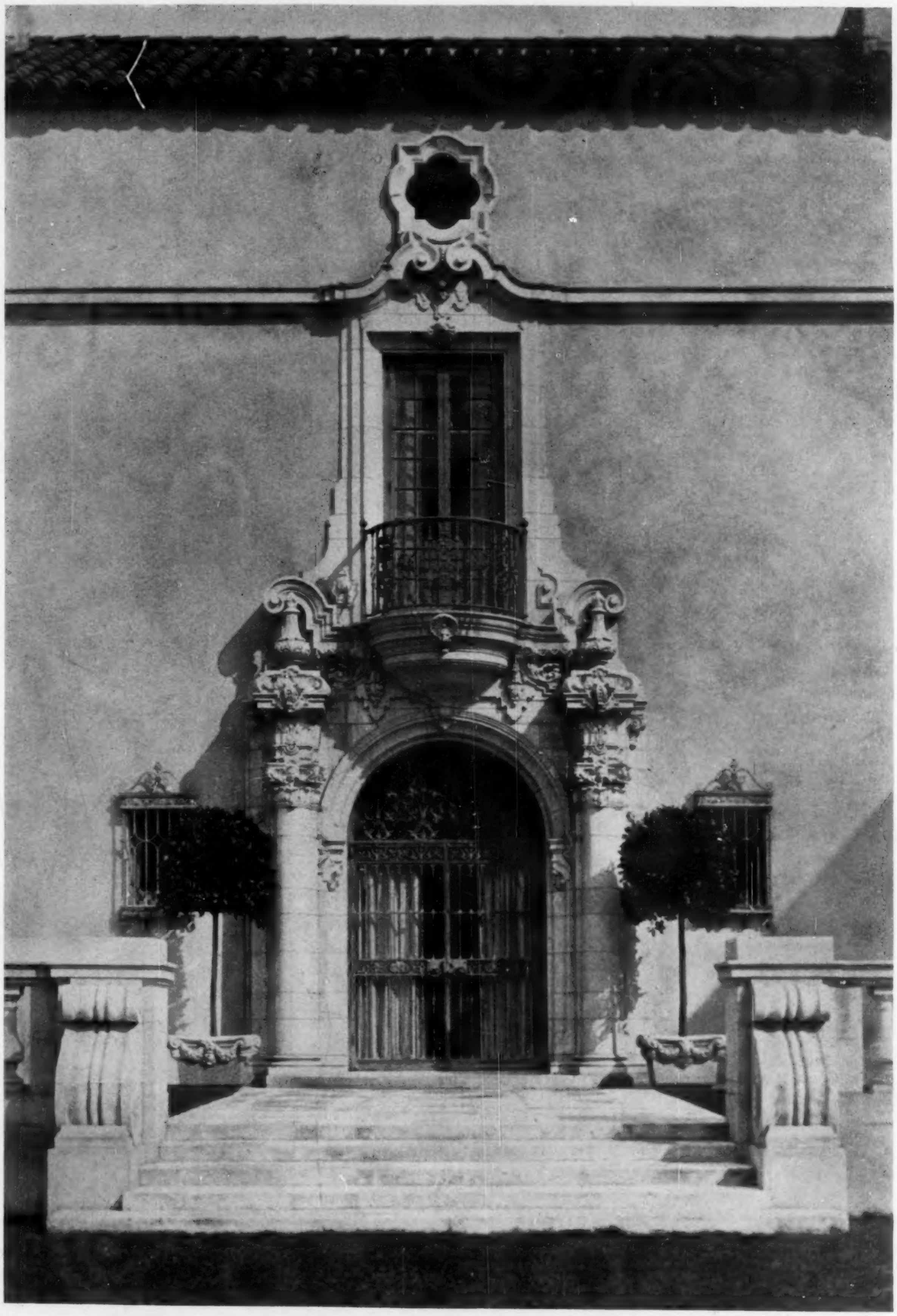
All these "World's Fairs" or "Expositions" were, therefore, of immense educational importance, and had not only local but widespread effect, especially in architecture. This is indicated in the subsequent steady improvement, not only in the designs of architecture itself, but in those of the minor accessory arts.

In California, without making any invidious comparison between the two exhibitions of San Francisco and San Diego, it is permissible to say that it was chiefly the San Diego Exposition which roused the present appreciation of Spanish Colonial architecture. The writer believes, and has heard it often from other travelers, that nowhere to-day is there a more beautifully designed and logically detailed group of modern buildings than those of the principal part of the San Diego Exposition, enhanced as it is by that monumental and impressive arcaded viaduct which leads the eye to the dominating tower and dome. It is true that this exposition is the greatest single factor influencing the present growth of good Spanish Colonial architecture in California, yet its influence would have been comparatively weak and ineffective had the seed fallen on poor soil. However, this was bound, fortunately, to be otherwise, inasmuch as California possessed not only an appreciative public, but what was equally effective, many young, well trained and enthusiastic architects to whom the various virtues of the historic style strongly appealed.

Also it is not entirely to the influence of the expositions and of San Diego's in particular that the present improvement in design is to be attributed. Both eastern and Californian clients of wealth and education had before this time given to various architects the opportunity and encouragement to make radical departures from formerly acceptable commonplace methods and designs, and so a noticeable improvement already had begun.

The Romanesque revival of Richardson, admirable in many qualities when controlled by such a master, followed by the Italian revival of Messrs. McKim, Mead & White, and some of the later work of the returned Beaux Arts scholars, had reached and affected California, but no one of these forces had made a lasting impression on its domestic architecture. Even the Spanish and the

House of Herbert Coppell, Esq., Pasadena, Cal.
Bertram Grosvenor Goodhue, Architect



WEST ENTRANCE DETAIL, HOUSE OF HERBERT COPPELL, ESQ., PASADENA, CAL.
BERTRAM GROSVENOR GOODHUE, ARCHITECT

Byzantine Romanesque work at Leland Stanford University, and the successful designs by M. Besnard for the buildings of the University of California, had apparently had little or no effect, — certainly not enough to show that Californians and others deemed any one of these styles to be suited historically or climatically to California.

There was evident, however, in domestic architectural work a strong feeling that upon some classical basis, such as Greek, Roman, or the later Italian and Spanish schools, could be begun a style which would harmonize with all local conditions.

Detail of Doorway
House of A. L. Garford, Esq., Pasadena, Cal.
Marston & Van Pelt, Architects

Classic art is now renascent in California, which fact, while not leading directly to a distinct national or even local style, is most interesting and suited to the climate and landscape, while its buildings are often of great beauty. Such a house is that of Miss T. H. Graham at Sierra Madre, near Pasadena. It is a dwelling of medium size but of striking individuality, of which the most noticeable feature in a long façade is the setting back of the second story so as to secure a terrace at that level across the entire front, flanked by pergolas or open loggias over which at present temporary dried palm branches rest in place of coming vines. In this home the designer has succeeded where many other architects fail. I know of no prototype in Italy unless at Positano.

Not many miles from this, at Altadena, is a house designed by Reginald D. Johnson, a less usual but very successful dwelling most fortunately placed where the view of it from the road is helped, as good designs generally are, by a background of the mountains.

Farther up the hill, at Altadena, is the residence of Mr. L. C. Brand, in the Spanish Colonial style. It is a very attractive house in its general proportions, picturesqueness and detail.

In the Spanish Colonial style originally, and to-day when well followed, the value of broad, blank wall surfaces is made the most of and utilized to enhance the effect of whatever ornament is placed about wall and window opening or by itself.

To this simplicity of plain wall, often slightly hand roughed, there was added by the early Spanish builders a restrained use of mouldings and the proper projection of eaves. One may safely say that in Spanish work, as elsewhere, a large expanse of wall and a few openings in proper scale surpass in beauty many openings in a small proportion of blank wall.

In many of the modern Spanish Colonial houses of California a very slight projection is given to the eaves, in accordance with the practical custom of certain early Californian builders of tiled roofs to which, on the less expensive type of structure, only enough overhang was given to secure a good drip and protect the wall below from wash, discoloration and disintegration. A slight eaves projection gives the effect of a very simple and inexpensive wall, such as that of an old farm or ranch house, but it is also true that the effect of antiquity may be secured even with a great eaves projection.

It cannot be denied that the use of a well ornamented and detailed doorway or window placed properly in a simple, even bare, wall of which the other openings are kept plain, is a very effective and interesting feature—one which has been often and effectively struck by modern designers, and yet logically and practically also it would seem better designing (where a coping wall is not called for) to avoid in such a design the farmhouse effect of no eaves projection whatever, as seen in certain houses, and give the eaves enough to secure a drip and a shadow commensurate with the quality of the rest of the façade.

The detail of Spanish mouldings and either profuse or simple ornament is beautifully enhanced in many modern examples by the simplicity of the walls, and by a painstaking adherence to hand-finished plaster on those walls, as has been secured on the Coppell and Ford houses in Pasadena and others. When the sun strikes the roughness at certain angles the suggestion of age is given and weathering soon makes it a permanent effect of varying tones. This characteristic architecture is achieved through a simple expression of structure accompanied by a logical use of local materials.

Interior Decoration

DECORATION AND FURNITURE OF THE LOUIS XVI PERIOD

By MATLACK PRICE

THERE is but little of the grandiose and theatrical pomp of Louis XIV, but little of the ornate Baroque spirit of the work of that period that is directly available for use in this country to-day. And only limited and very judicious use may be made of the exuberant and frivolous style of Louis XV to-day. The lessons of both schools of architecture are to be found, rather, in a cultivated appreciation of the largeness of concept and the bold manner of designing characterized by the first, and the versatility and brilliant audacity characterized by the second.

In the style of Louis XVI, however, is found a remarkably perfect thing, and a thing which synchronizes very directly with our own tastes and requirements.

The style of Louis XVI is the finished result of the intensive work of the architects of the two preceding periods, with certain added elements. Its basis of reason, and plan and alignment of parts, are the outgrowth of years of sincere academic conviction on the part of the more conservative of the French designers. Its classic quality is the result of final reaction from the Baroque and the Rococo, with strong contemporary interest kindled by new discoveries of classic remains. Having found the fountain head of inspiration which had fired the minds of Vitruvius and Palladio and other Italian Renaissance architects, the architects of France now turned to the actual monuments of classical antiquity instead of to old Italian books.

Other influences, more superficial, contributed to the development of the more detailed aspect of the style; but its fundamental traits were an almost inevitable result of what had gone before.

From the standpoint of interior decoration there are several essential points which should not be overlooked. Of these one of the most significant is that of *unity*—a point especially characteristic of the architecture, furniture and decoration of the period of Louis XVI. It has been said that "there has been in all the history of decorative furnishings no other period (and no other people) so conscious of the value of the ensemble as was eighteenth

Examples of Louis XVI Chairs from the Collection at Versailles

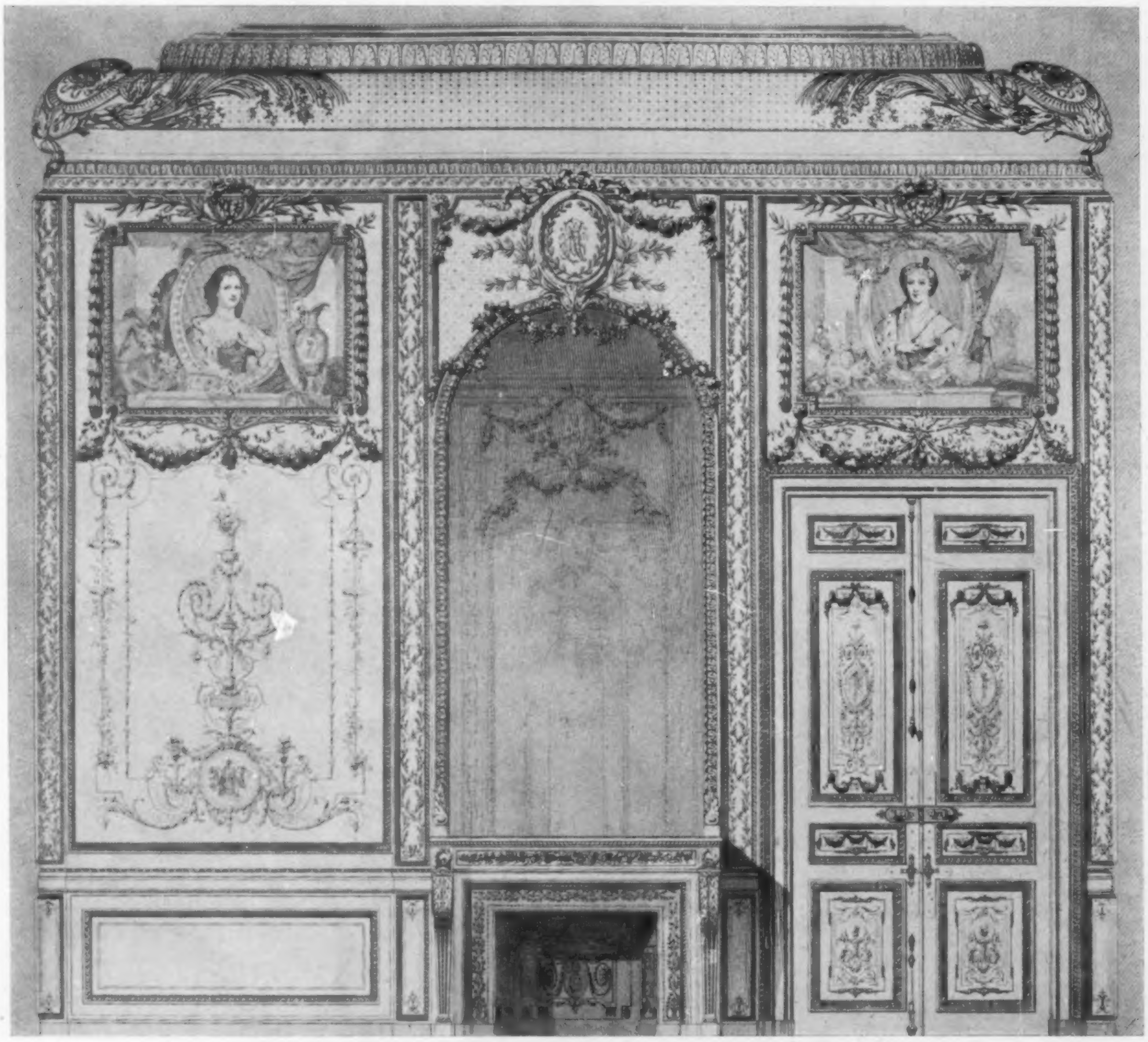
century France of the time of the Louis." Each decorative element, whether a wall treatment, a panel, a chair, a piece of fabric or a clock, was not only perfect in itself, but a perfect part of an entire scheme. The style was more consistent, more obviously studied than the work of any time since the period of Henri II. Baroque and Rococo excesses were abandoned, and there was an evident return to the sound principle of decorating construction instead of constructing decoration.

One reason for the adaptability of the Louis XVI style to use to-day lies in the fact that it is essentially the style of the *petit salon*, rather than of the vast and imposing interiors which were devised as settings for the pompous court affairs of Louis XIV. The small salon and the boudoir became even more popular under Louis XVI than in the preceding reign, when their popularity commenced.

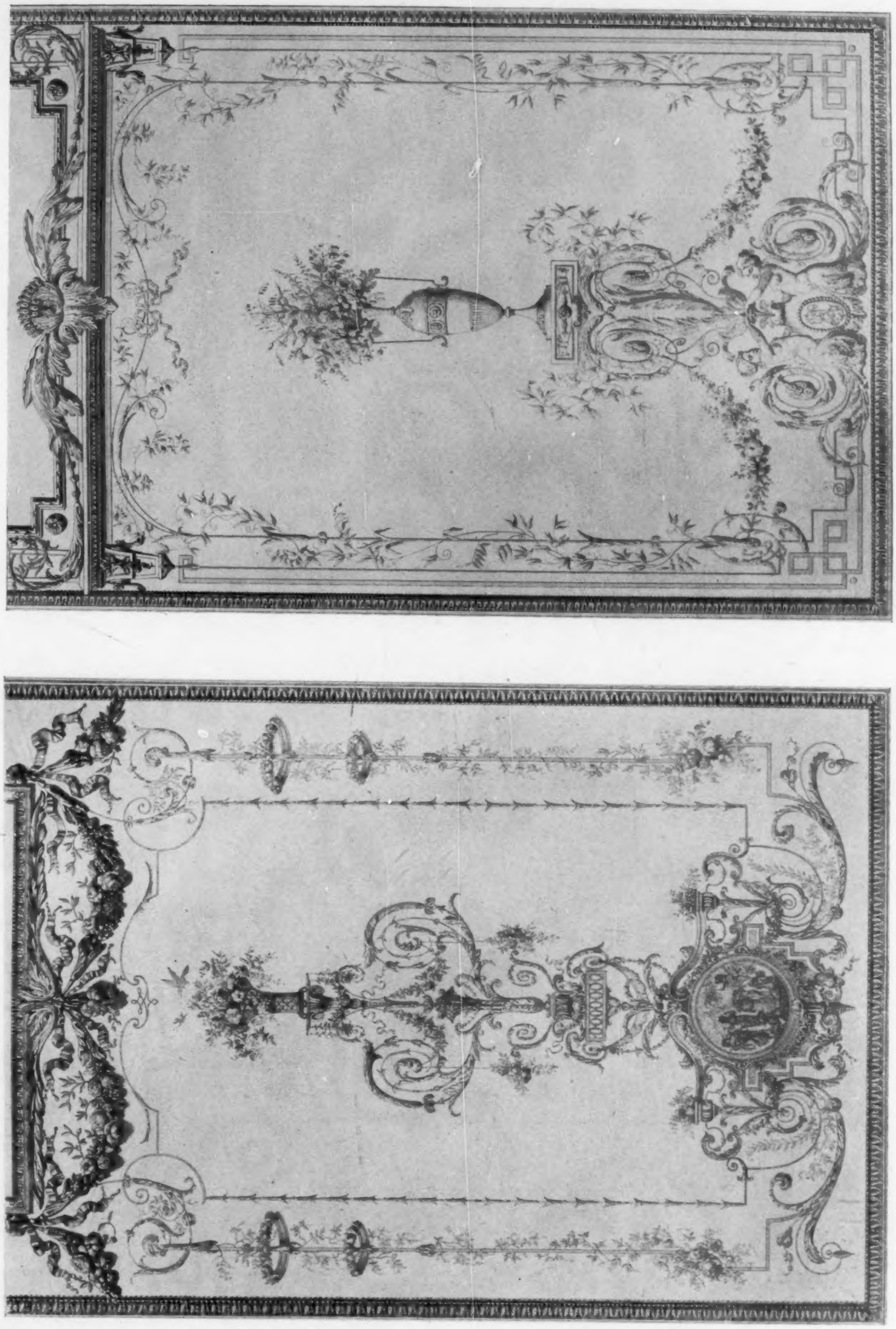
The fineness in scale of the interior detail and the furniture of Louis XVI make the style especially adaptable for use to-day in the treatment of the reception room, the breakfast room and the small dining room, as well as the bedroom and boudoir. Another distinct quality which makes for the present-day utilization of the style is its similarity in feeling to the works of the master-stylists of Georgian England, especially the Brothers Adam.

The interior decoration and furnishing of the large modern hotel, an absorbing study in itself, has for many years leaned strongly toward the style of Louis XVI for inspiration, and in many examples of its use has shown that the fundamental "rightness" of the style, in its purely architectural sense, admits of a remarkable range for adaptation.

In the design of interiors, two principal kinds of detail appeared, but both were consistently treated, and both were subordinate to one great governing



Wall Treatment of a Louis XVI Salon, Palace of the Tuileries, Paris
From Designs by Lefuel



PANELS FROM THE APARTMENTS OF THE EMPRESS, PALACE OF THE TUILERIES, PARIS
FROM DESIGNS BY LEFUEL

characteristic, which was a combination of scale and alignment.

Gone were the fantasies in scale which made the Baroque element in French architecture as distressing as it was entertaining; gone the unsymmetrical madness of the Rococo element, which was as reprehensible as it was vivacious.

If one were to name only one salient merit of the style of Louis XVI, it should be the merit of studied nicety in scale, which made itself felt not only in the proportions of the larger elements of design, but in the smallest details as well.

These details, of two principal kinds, were virtually all subordinate to the characteristic paneled treatment of interiors, which divided wall spaces into harmonious units, breaking up the scale of a large room and effecting harmonious alignments with door and window heads, and with the different spaces to be dealt with in the whole room.

Fine mouldings, usually gilded, set off these panels, which, when not of plain painted wood, consisted of mirrors, paintings or decorative fabrics. Within tall, narrow panels, especially at the corners of rooms, appeared low-relief decorations, which often consisted of the "attributes" of the rustic whim of fashion, inspired by the "back to nature" and "simple life" writings of Jean Jacques Rousseau. It must have pleased the whimsical fancy of many a sophisticated court lady besides Marie Antoinette to have her salon embellished with decorative gilded groupings of wheat-sheaves, rakes, spades, shepherdess' crooks and farm baskets, entwined with graceful ribbons. And no less in accord with the romantic fancies of the period were the flaming torches, quivers of arrows and Cupid's bows, which so often formed the motif of the decorator.

The classic inclinations of the period were represented by sphinxes, griffins, lyres, bases and urns, the latter often flaming or sedately draped with finely modeled cloth swags. The classic element further appeared in the treatment of most Louis XVI mouldings and bands — such motifs as the egg-and-dart, the fret, the wave, the guilloche, the bound reed, and all manner of beadings, as well as the acanthus and the spiral scroll. In accord with classic precedent, wreaths were made up of oak, bay or laurel, which did not conflict, however, with the graceful floral swags and garlands appearing in much work of the period. These were characteristically executed with the utmost delicacy and refinement, and in fine scale

Examples of Louis XVI Chairs from the Collection at Versailles

OVERMANTEL AND DRAWING ROOM IN THE LOUIS XVI STYLE, NEW YORK CITY RESIDENCE

A. I. BODKER, ARCHITECT

with any composition of which they formed a part.

The typical fireplace treatment was singularly simple in comparison with the work of previous periods. The openings were kept low and framed by low mantels of wood or stone, the former painted and carved, and the latter also carved in fine detail, often with inserts of colored marbles. The mantel shelf was supported by consoles of classic form or by *termes*. The overmantel space was generally filled by a large mirror and, in the case of high ceiled rooms, a decorative panel was often introduced above the mirror.

Ceilings were restrained in design, and, in the latter years of the period, were flat, without coves, and quite plain with regard to surface decoration. In others architectural mouldings and decorated bands divided the space into symmetrical panels that conformed with the careful symmetry that was so characteristic of the wall treatment. When plaster decorations were used, they were frequently colored.

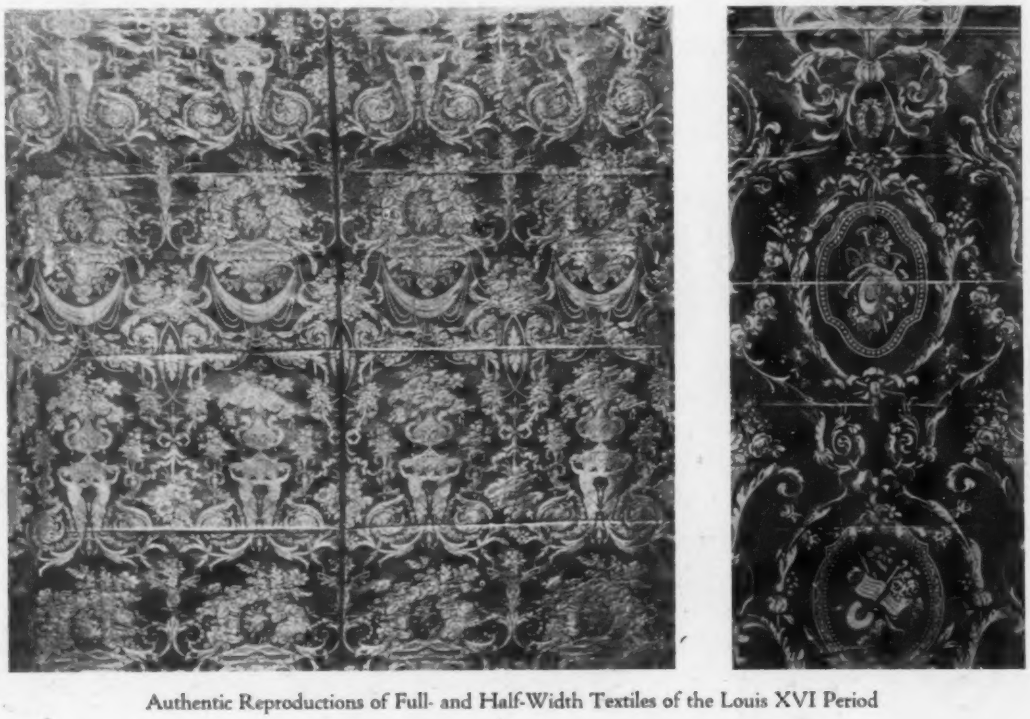
One of the most characteristic forms associated with the period is the ellipse, which is seen in the treatment of windows, mirrors, wall paintings and overmantels. Even the ellipse, however important as it is in so many Louis XVI decorative compositions, is, like all other curvilinear forms, subordinated to rectilinear forms. The ellipse was a favorite form for chair-backs, and exquisite tapestry coverings were woven to fit. The furniture, for the most part, was identical with the interior architecture of the period in design and scale and general feeling. Much furniture was gilded, and gray was a favorite color, while the highly decorative note was afforded by cabinets and consoles in the rich and elaborate marquetry and ormolu of Riesener. The characteristic lines of Louis XVI furniture were straight and slender: cane-work came into vogue as well as tapestry or brocade covered upholstery; but always there was a remarkable affinity between furniture and interior. Decorative fabrics and floor coverings were in character with the whole scheme, as, indeed, was every component part, including the costumes of those who originally devised the style as a fit setting for their gay and sophisticated life.

The color schemes of the period were delicate and subdued, consisting of cool, harmonious combinations of such colors as white, rose, pearl gray, light blues and greens, with richness added by means of a skilful application of gilding to mouldings and ornaments.

It is obvious that a style of such intrinsic nicety and perfection could never become obsolete, but must be destined to find an increasing appreciation as time goes on.

As Ward points out, "The style of Louis XVI constitutes one of the most homogeneous and least strained adaptations of classical architecture to modern requirements" — a characterization which gives much of the reason for its availability to-day.

Certainly the whole field of interior decoration has been inestimably enriched by the legacy of this era of eighteenth century France, which has given us a style so perfectly coordinated in its parts, and so expressive in its ensemble of an urbanity and a degree of civilization intensely worth perpetuating and carrying on.



Authentic Reproductions of Full- and Half-Width Textiles of the Louis XVI Period

Two Recent New York Churches

FROM THE DESIGNS OF BERTRAM GROSVENOR GOODHUE

By MATLACK PRICE

IN no type of building are the elements of tradition and precedent so insistent or so pervasive as in the church, and in none may these elements be made so powerful a factor in the achievement of a splendid and noble work of architecture. The church architect must have not only the practical ability and the spacious vision of the master builder, but the erudition of the scholar as well. With any one of these faculties alone, or even with but two of them, he must in all likelihood fail to achieve a really great church.

At the forefront of American church architects, Bertram G. Goodhue has long occupied a conspicuous position because he is not only an architect in the old sense of a "master builder" but in the essential attainment of a remarkable degree of scholarship in the field of church architecture, church details and ecclesiastical symbolism.

The extent to which Mr. Goodhue's attainments are developed must be apparent in even such necessarily brief notes as the following on two recent churches of his design, in the distinct styles which we know as Gothic and Romanesque.

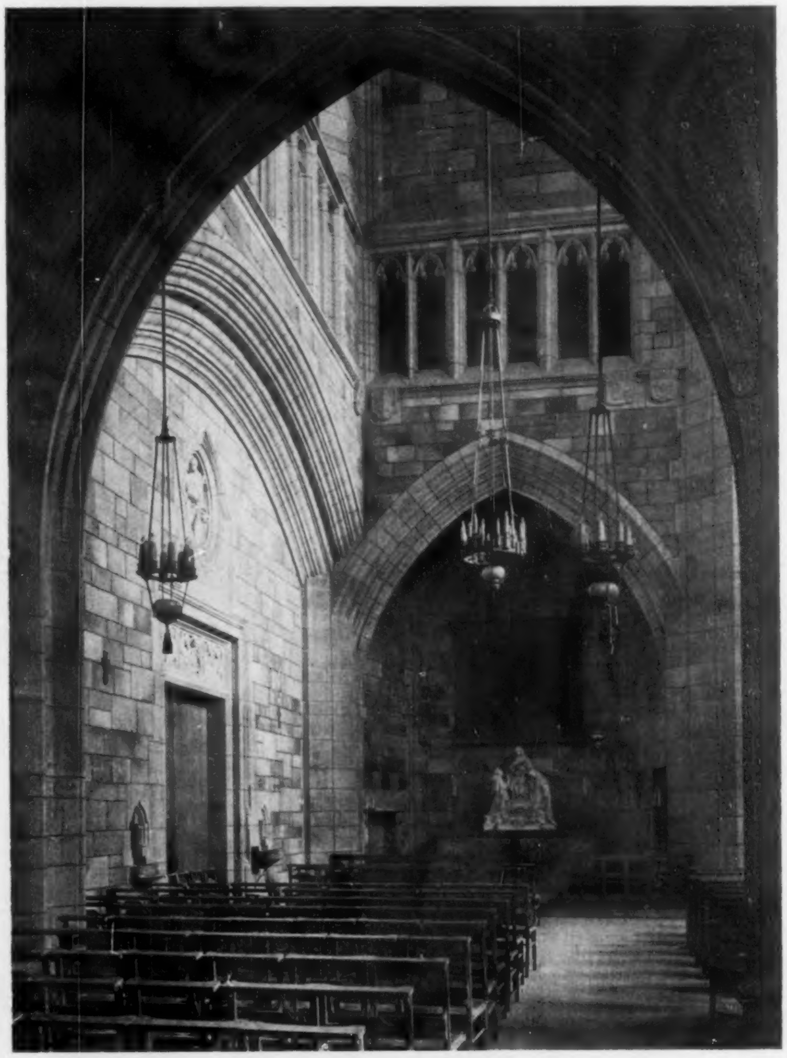
THE CHURCH OF ST. VINCENT FERRER

In planning and designing the Church of St. Vincent Ferrer, the architect had before him at once the creation of a church for a great and historic religious order — that of the Dominican Friars. In the design, therefore, lay the inspirational opportunity of expressing and incorporating the wealth of Dominican tradition and imagery, which is a fabric of seven hundred years' growth. In this respect it is far more than a mere church; it is a remarkable example of detailed religious history in which every provision has been made for carrying on the special forms of ceremonial which distinguish the Dominican rite from the Roman.

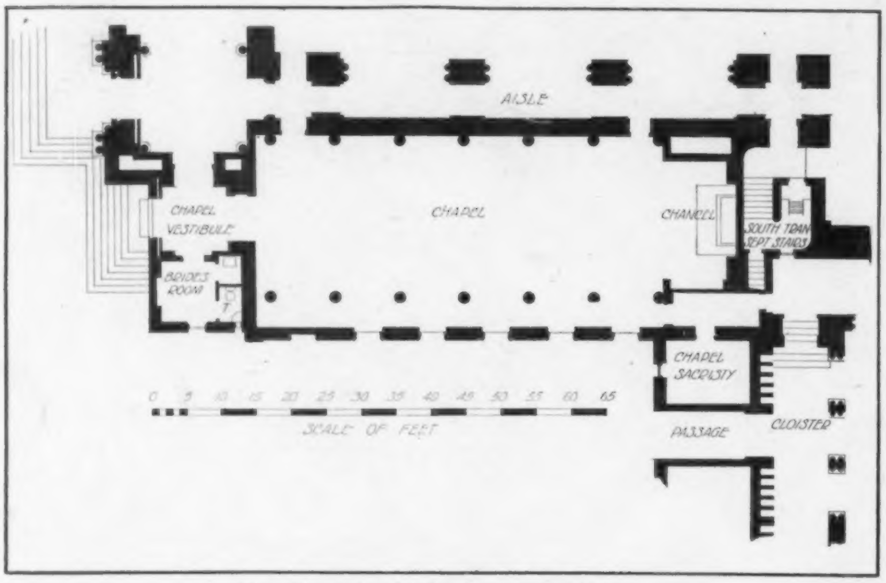
The Gothic style was regarded as especially appropriate for this church, as the Dominicans built the only Gothic church in Rome — St. Maria Sopra Minerva.

The exterior of St. Vincent Ferrer, not entirely unlike the same architect's treatment of the Chapel of the Intercession for Trinity Church, gives the effect of a square-topped façade, with a tall, steep roof. The St. Vincent roof of copper is recessed to provide a ledge upon which will be ranged statues of Dominican saints, effecting a continuity of the line of those already in place on the octagonal turrets.

The four great niches will contain statues of the four Dominican Popes, adding further to the already highly historical significance of the whole church as



Lady Altar in North Transept, Church of St. Vincent Ferrer



Floor Plan, Chapel, Church of St. Bartholomew

a history, in architectural terms, of the Dominican Order. The whole concept of the exterior combines dignity, and a sort of rich austerity with the utmost expression of special symbolism, as evidenced in the treatment of the west front.

Of this a more detailed description than is possible for the whole church may serve to show the extent to which this special symbolism has been developed throughout. "In the center of the tympanum is the image of the Patron — St. Vincent Ferrer, with the arms of the Order beneath. St. Vincent is flanked by St. Dominic, the founder of the Order, who, in turn, is flanked by his symbols of the dog and devil's head — and St. Francis, founder of the Franciscans with the symbols of the lamb and the wolf. The friendship of St. Dominic and St. Francis has manifested itself throughout the seven hundred years' existence of the two Orders. The arch itself is replete with foliage, symbolism and scenes from the lives of the three saints above mentioned. The arch label ends with two figures representing the Old and New Dispensations. St. Veronica, with the imprint of Christ's face, represents the New, and a partially veiled head represents the Old. Above each are shields bearing emblems of the Passion. Of course the crowning feature of all is the great Rood, very boldly chiseled (Lee O. Lawrie, Sculptor) — the first to appear on the exterior of any Catholic church in New York. Above the figure of Christ is a canopy supported by angels, and the emblems of Mary and John are boldly displayed on either side, with mottoes beneath."

In plan the Church of St. Vincent Ferrer is cruciform (about 221 feet in length) and oriented. The north transept is dedicated to Our Lady, since its door leads into the Lady Chapel, formed by the north aisle and transept.

One of the special provisions for Dominican ritual is seen in the exceptionally large choir, which makes the chancel longer than that of any Roman Catholic church in this country. The choir is somewhat narrower than the nave, due to the original expedient of building within the old walls, and, as in the case of many European churches which have undergone historic developments and evolutions, the resultant effect is very interesting.

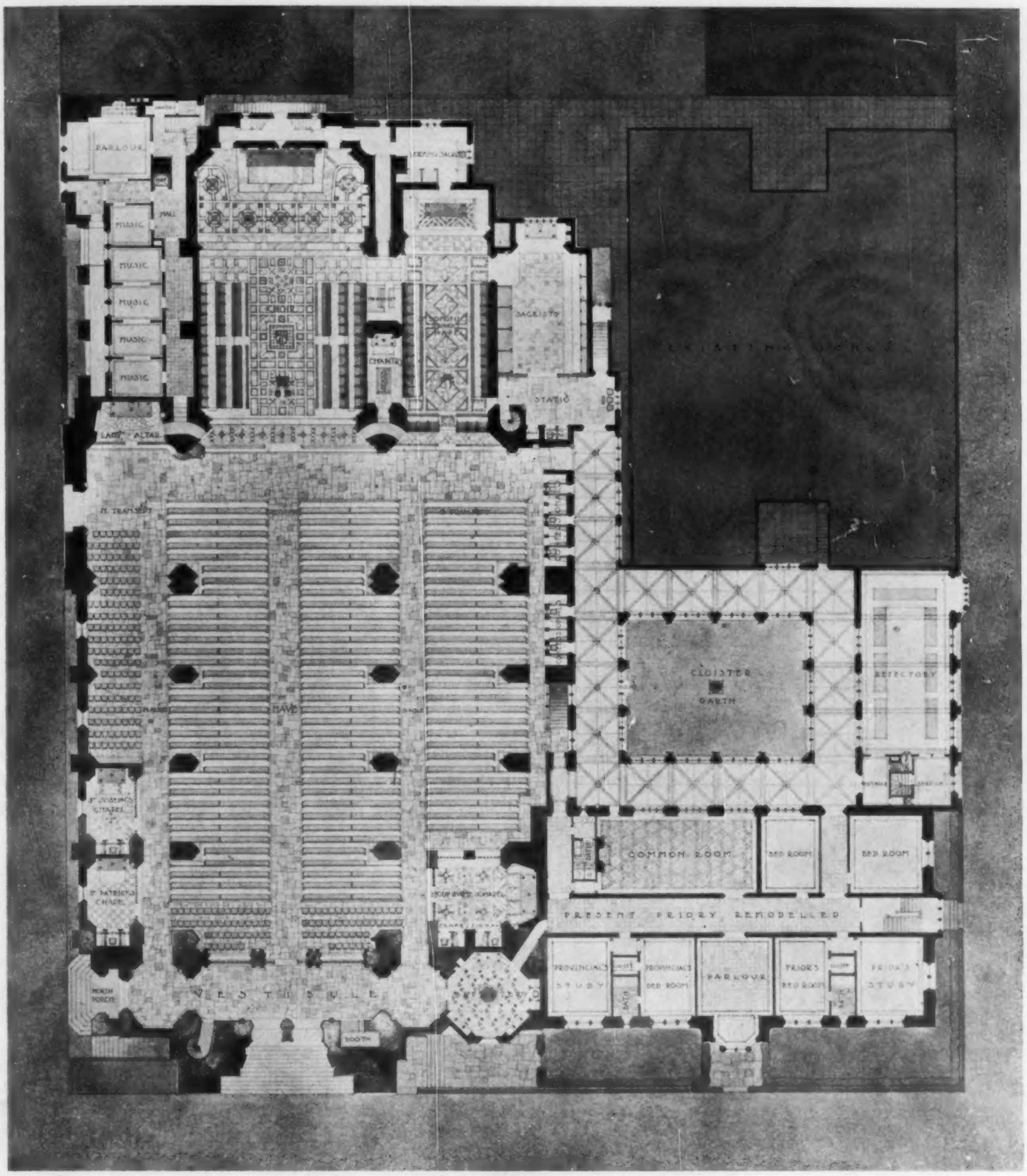
The nave is entered through a large narthex, to the south of which is the octagonal, vaulted baptistry in its traditional and symbolical position at the entrance, and distinctly apart from the church. To the east of the south aisle, and south of the church, is located the Friars' Chapel, which has its own stalls, organ, choir screen and loft, and in its whole effect the architect's intention was to suggest a medieval parish church.

The garth will be completely enclosed when the new Refectory is built and the old Priory wall is re-faced to conform with the other new work.

In matters of detail and equipment the church of St. Vincent Ferrer is unusually interesting, though many important things, such as the permanent high altar, the reredos and the pulpit in the Presbytery and the paintings of the Stations of the Cross are yet to be installed.

In every detail the most has been made of the ritualistic and historic symbolism associated with the Dominican Order, as for example, in the Rood Beam, which afforded Mr. Goodhue a fine opportunity to exercise his unique genius for reviving the rich splendor of Gothic polychrome. The great beam, supported at either end by stone corbels in the form of cherubim, is richly carved and colored and gilded, with symbolic figures and ritualistic texts in Latin, carved and emblazoned, with letters in red, gold and black.

In a church of such exceptional architectural merit as St. Vincent Ferrer, it is fortunate that the hand of the architect has been allowed to make its artistry apparent in virtually all the equipment and decoration, and that these varied things are all being specially designed and wrought. Although fashioned by able craftsmen, the architect made the designs for such important ritualistic



Floor Plan, Church of St. Vincent Ferrer

details as the Tabernacle and the hanging Pyx.

But mere details in themselves, no matter how interesting, constitute merely a categorical description — and a noble building, especially a church, is, or should be, an organic thing, full of meaning and inspiration to all who behold it. What, then, is the message of the Church of St. Vincent Ferrer, and of the powerful architectural personality that animates its design in structure and in detail?

From the church as a whole, viewed even under the disadvantage of distracting city surroundings, emanates a tremendous architectural quality of dignity. There is massiveness in the great buttresses; there is a fine sense of stability in the whole edifice. There is renewed evidence (not the first from Mr. Goodhue's hand) that the Gothic spirit is not dead; that the style is not a dessicated archeological thing, but a still living and growing organism.

ST. BARTHOLOMEW'S CHURCH

The architectural style in which this church is designed was dictated by the initial decision to incorporate in the new building the well-known Romanesque triple entrance portals from the old building: the manner in which the style is rendered reflects the vigorous and well-based architectural convictions of the architect.

Known for so many years as a designer of Gothic churches, and known, too, though less extensively, as a remarkably skilful designer in the style of the Spanish Renaissance, considerable interest was evinced by critical observers of contemporary architecture in what would be Mr. Goodhue's rendering of a large and important church in the Romanesque style.

It should be obvious that a finished opinion of the whole cannot be put forth when the great tower and cupola remain yet to be built, since this feature, when added to the present structure will dominate the composition. Without it we see but a portion of the architect's intention; as the building stands, it is but a portion of the architect's vision, and is, therefore, a better subject for the study of detail than of the larger relationships of its design.

The illustration of the main church has been left to a later date when the work will have reached completion and it can be presented in its entirety. The illustrations in this issue are of the chapel, which is the only part of the structure complete at this time.

The plan of the church is cruciform, and so disposed that the pulpit and lectern may be seen from every seat. The three aisles correspond to the three doors which give from the narthex into the church, these, in turn, being designed to conform with the triple entrance (west front) taken from the former building of the church at Madison avenue and 44th street.

The main body of the church and the transepts have great barrel vaults, and at the intersection four massive piers support four impressive arches, upon which rest the walls which form the lower story of the ciborium. In churches of the Romanesque type the form of central tower designed for future addition to this church is by no means usual, the most conspicuous precedents existing in St. Maria della Grazie at Milan and the Certosa at Pavia.

The feeling of the whole building, not only in its entirety but so far as it has been finished, is that of the Italian type of Romanesque rather than the French. Although the triple portal which determined the choice of Romanesque was based by McKim, Mead & White upon the doors of St. Gilles, in the south of France, the manner of its execution, as might be supposed, was distinctly Italian.

This beautiful doorway from the old St. Bartholomew's Church is better placed in the new building since it carries above it no heavy superstructure, but only the projecting front of the narthex. The architect, quite rightly feeling that it would be unwise to construct a design which would in any way tend to compete with or overshadow this famous door, kept its immediate setting restrained and largely unembellished.

Aside from the west front, the most conspicuous exterior features are the north and south transepts (especially the latter) and a very interesting arcaded porch on the north side, with beautifully designed Romanesque columns and entwined, interlaced capitals.

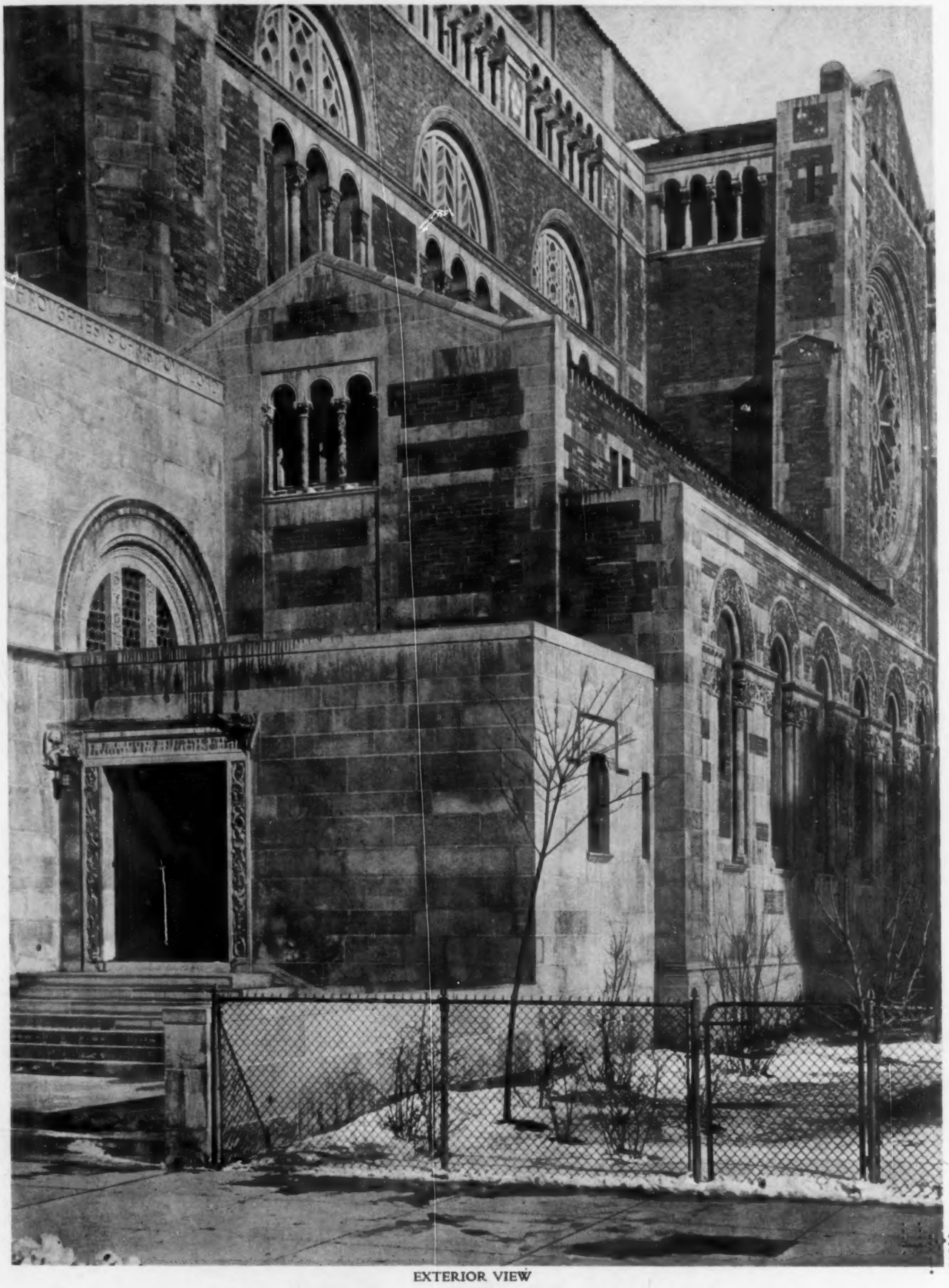
The south transept has a large rose window, seen in one of the plate illustrations, with small Romanesque columns of different colored marbles radiating like the spokes of a wheel, and much carved interlacement in the stone structure of the window. The corners of this transept terminate above in great figures of St. Bartholomew and St. Philip, and below the rose window is a projecting, arcaded porch — one of the lower masses of the building which, like the narthex, were designed to give greater scale to the main body of the church and the central towering mass of the ciborium.

In choosing materials for the exterior, the Romanesque style naturally called for a small unit and for a stone which would lend itself readily to intricate carving. For the latter purpose Indiana limestone was chosen, and for the body an unusually interesting orange colored brick, made in various sizes and proportions, so that the monotonous effect of regular courses was avoided.

These two materials were so disposed in the design as to effect a gradation from more stone than brick in the lower portions of the building, and more brick than stone in the upper portions.

The interior piers and arches, with stone and marble veneer over concrete, are detailed to conform with the large scale of the nave and transepts, while a more intimate and small scale treatment was possible in the chapel. Here the shafts of the columns from the old church were used, with newly carved capitals, supporting a trussed timber roof, gorgeously decorated in the polychrome manner of the roof of San Miniato, in Florence.

It is a noble project, not entirely finished, but giving every evidence in its broader aspects of planning, as well as in the imagination and imagery of its fascinating detail, that the architect is not an architect in one style, but in the larger sense of the word — a master builder — in whose hands a style is a means and not an end of expression.



EXTERIOR VIEW

CHAPEL, CHURCH OF ST. BARTHOLOMEW, NEW YORK, N. Y.

BERTRAM GROSVENOR GOODHUE, ARCHITECT

MU

DETAIL OF ENTRANCE

CHAPEL, CHURCH OF ST. BARTHOLOMEW, NEW YORK, N. Y.

BERTRAM GROSVENOR GOODHUE, ARCHITECT

MU

DETAIL OF CHANCEL

CHAPEL, CHURCH OF ST. BARTHOLOMEW, NEW YORK, N. Y.

BERTRAM GROSVENOR GOODHUE, ARCHITECT

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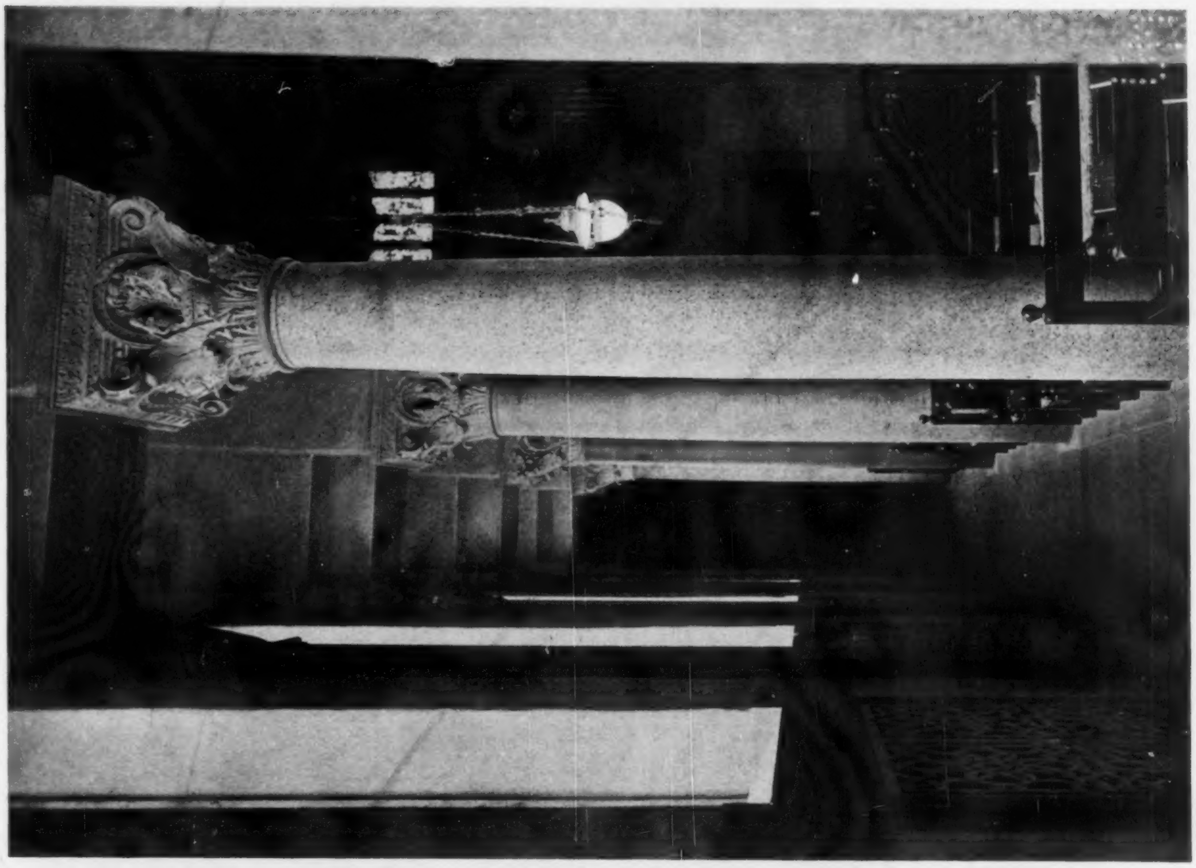
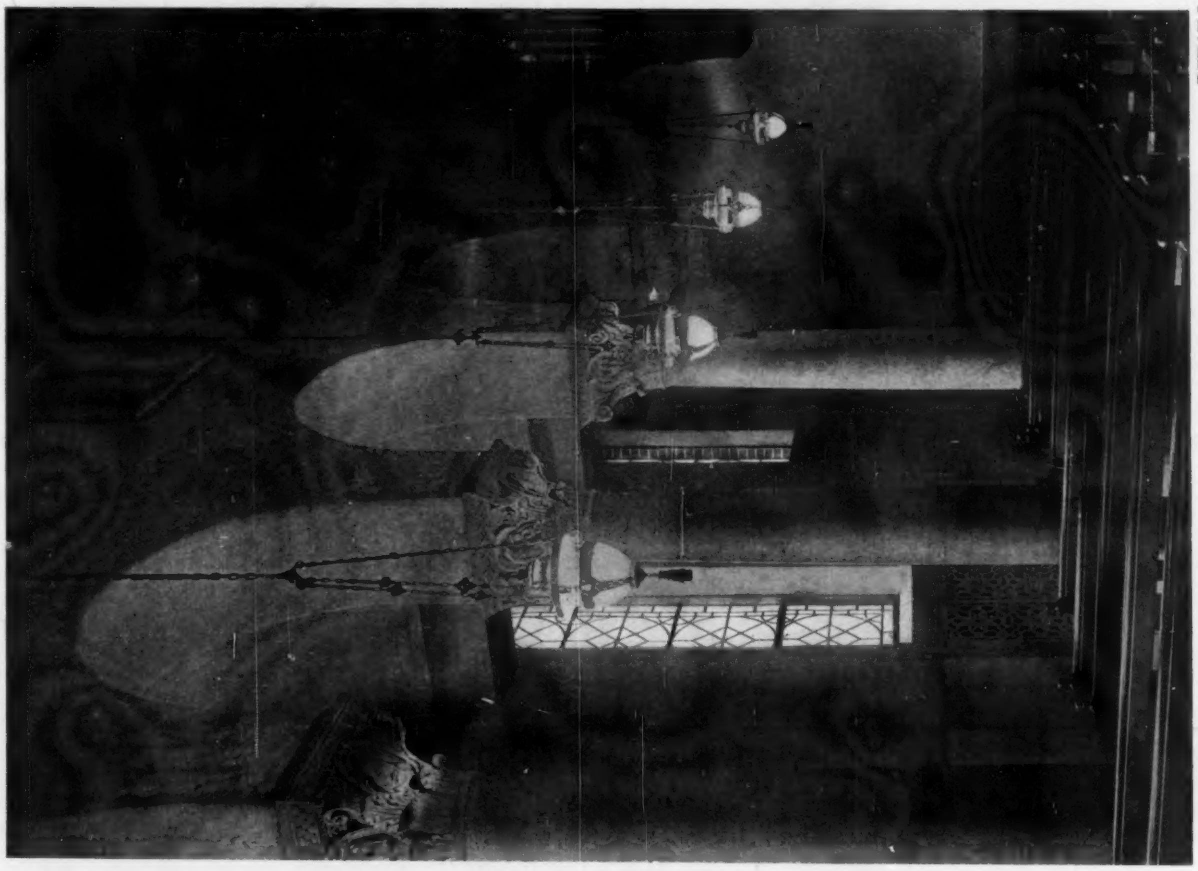
VIEW SHOWING ORGAN SCREEN

CHAPEL, CHURCH OF ST. BARTHOLOMEW, NEW YORK, N. Y.

BERTRAM GROSVENOR GOODHUE, ARCHITECT

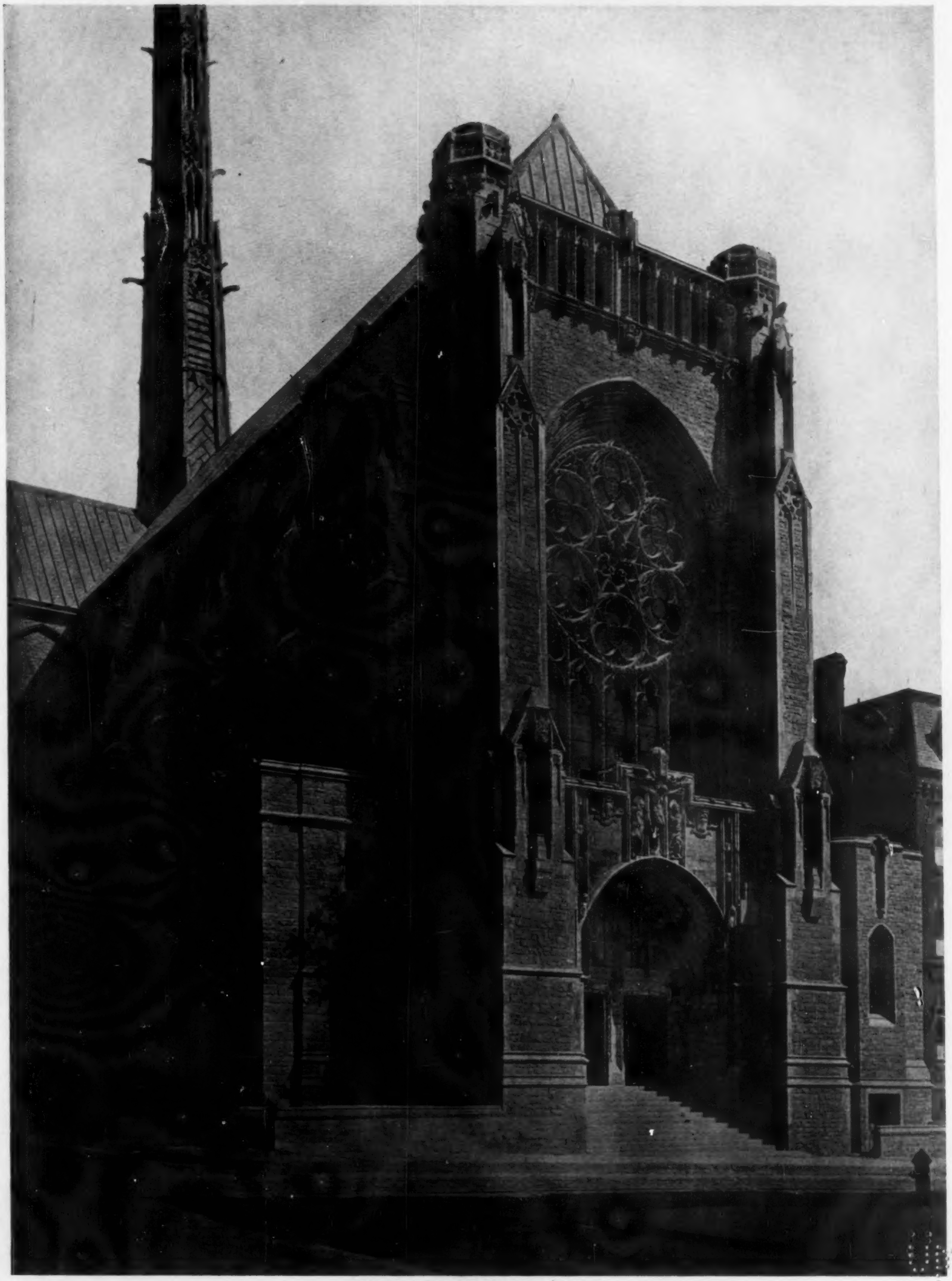




DETAILS OF AISLE

CHAPEL, CHURCH OF ST. BARTHOLOMEW, NEW YORK, N. Y.

BERTRAM GROSVENOR GOODHUE, ARCHITECT



VIEW FROM LEXINGTON AVENUE

CHURCH OF ST. VINCENT FERRER, NEW YORK, N Y.

BERTRAM GROSVENOR GOODHUE, ARCHITECT

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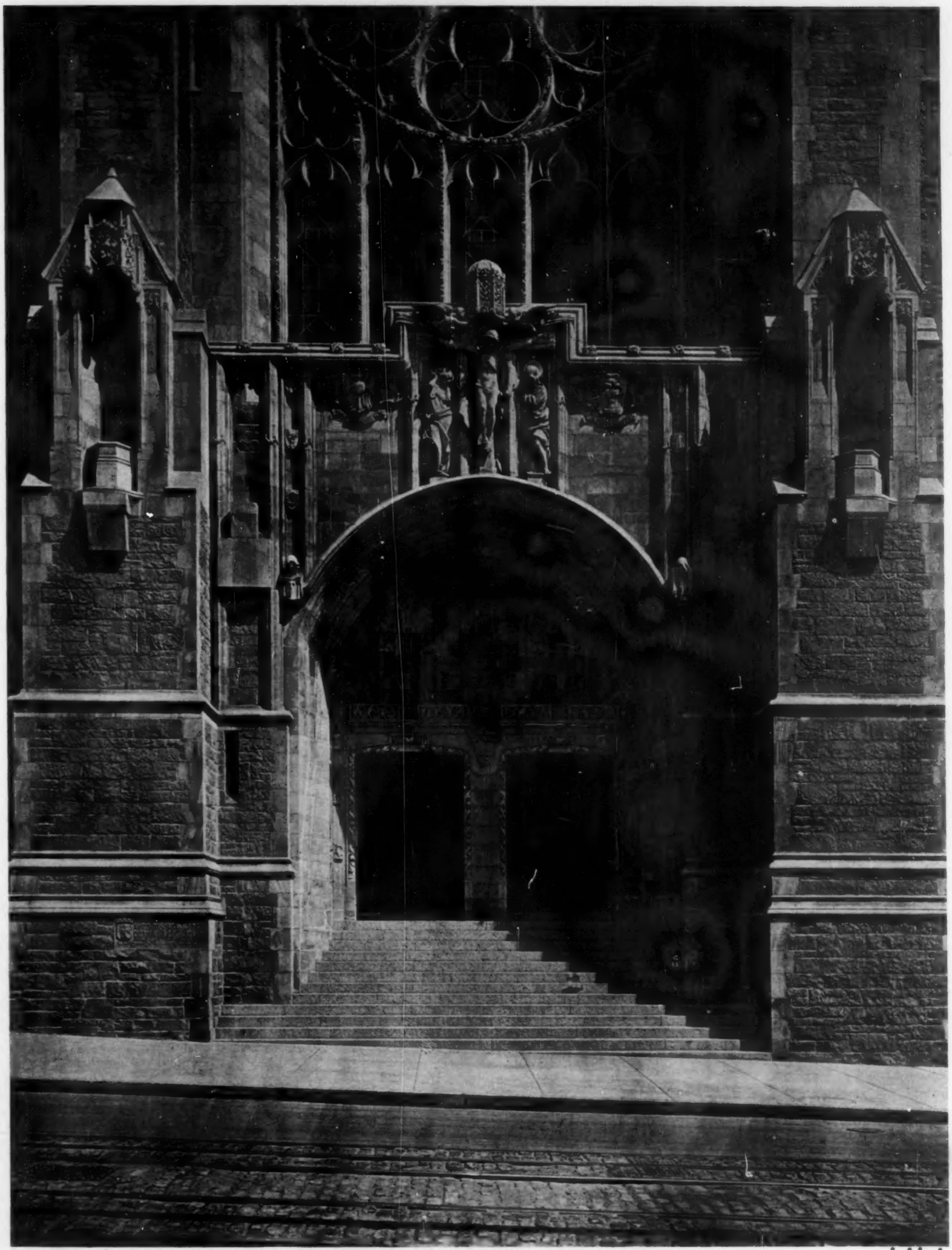

MAIN ENTRANCE DOORWAY

CHURCH OF ST. VINCENT FERRER, NEW YORK, N. Y.

BERTRAM GROSVENOR GOODHUE, ARCHITECT

A specially drawn detail of this doorway was published in *The Forum* Collection of Gothic Details, August, 1918

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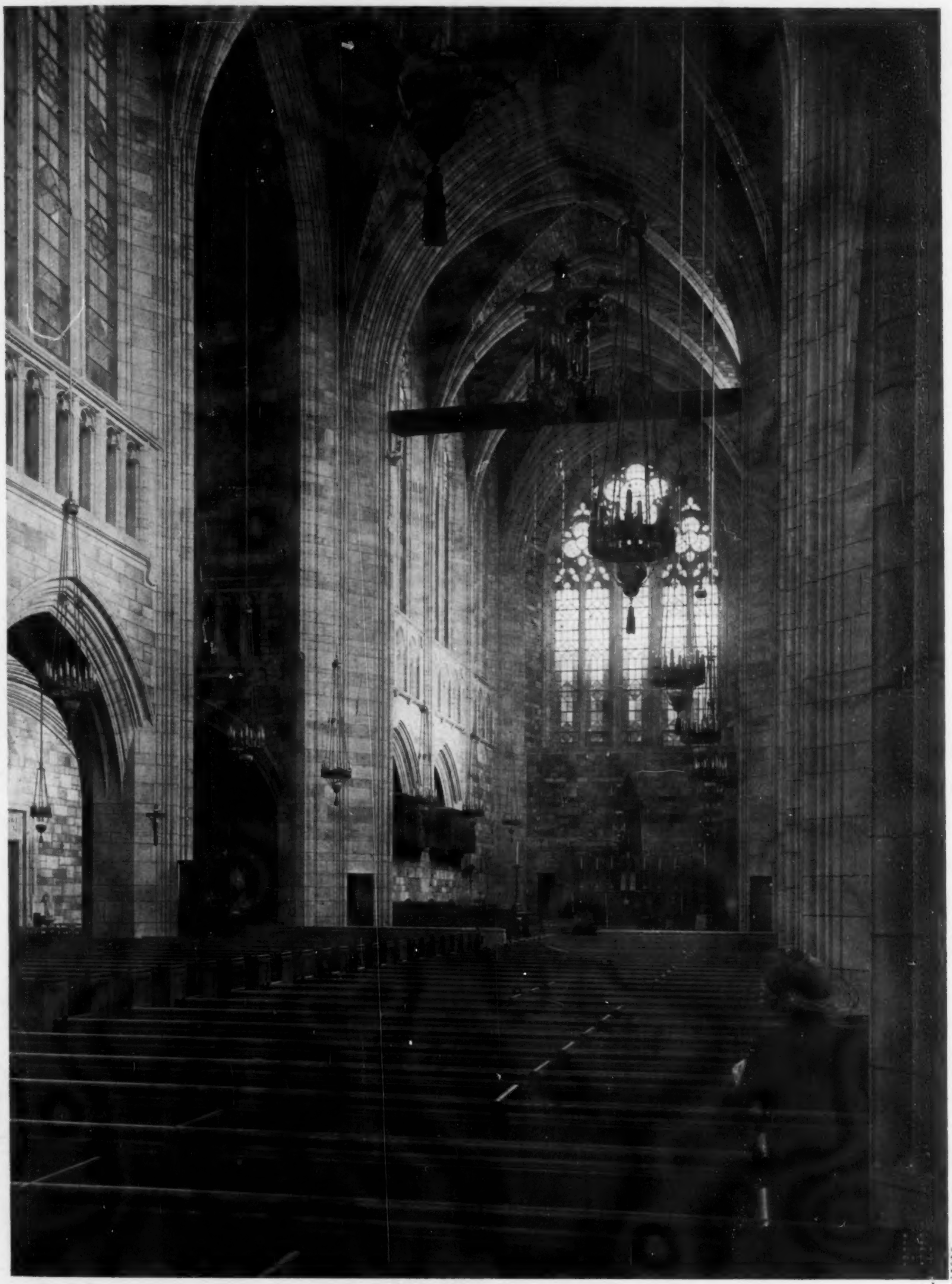

VIEW OF CROSSING AND CHANCEL

CHURCH OF ST. VINCENT FERRER, NEW YORK, N. Y.

BERTRAM GROSVENOR GOODHUE, ARCHITECT

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DETAIL OF TRANSEPT AND CHANCEL

CHURCH OF ST. VINCENT FERRER, NEW YORK, N. Y.

BERTRAM GROSVENOR GOODHUE, ARCHITECT

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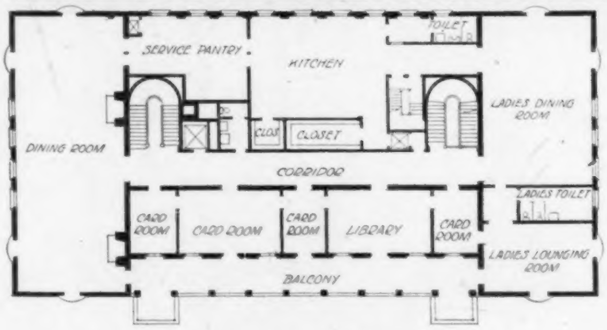
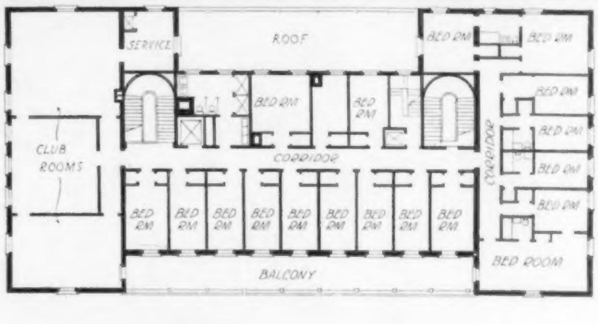
NAVE LOOKING TOWARD NARTHEX

CHURCH OF ST. VINCENT FERRER, NEW YORK, N. Y.

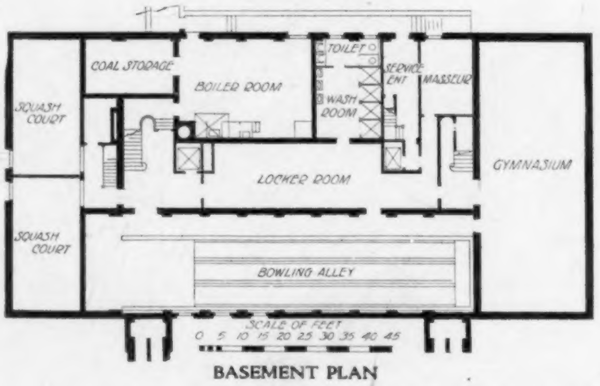
BERTRAM GROSVENOR GOODHUE, ARCHITECT



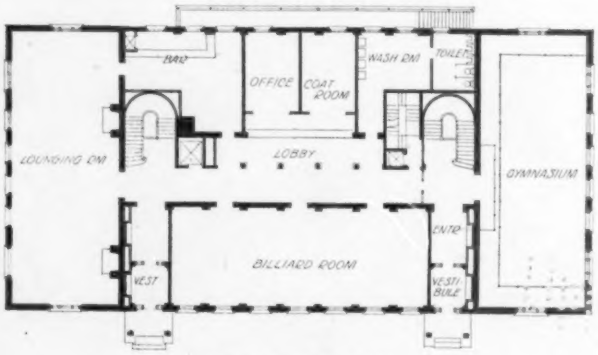
SECOND FLOOR PLAN



THIRD FLOOR PLAN



BASEMENT PLAN



FIRST FLOOR PLAN

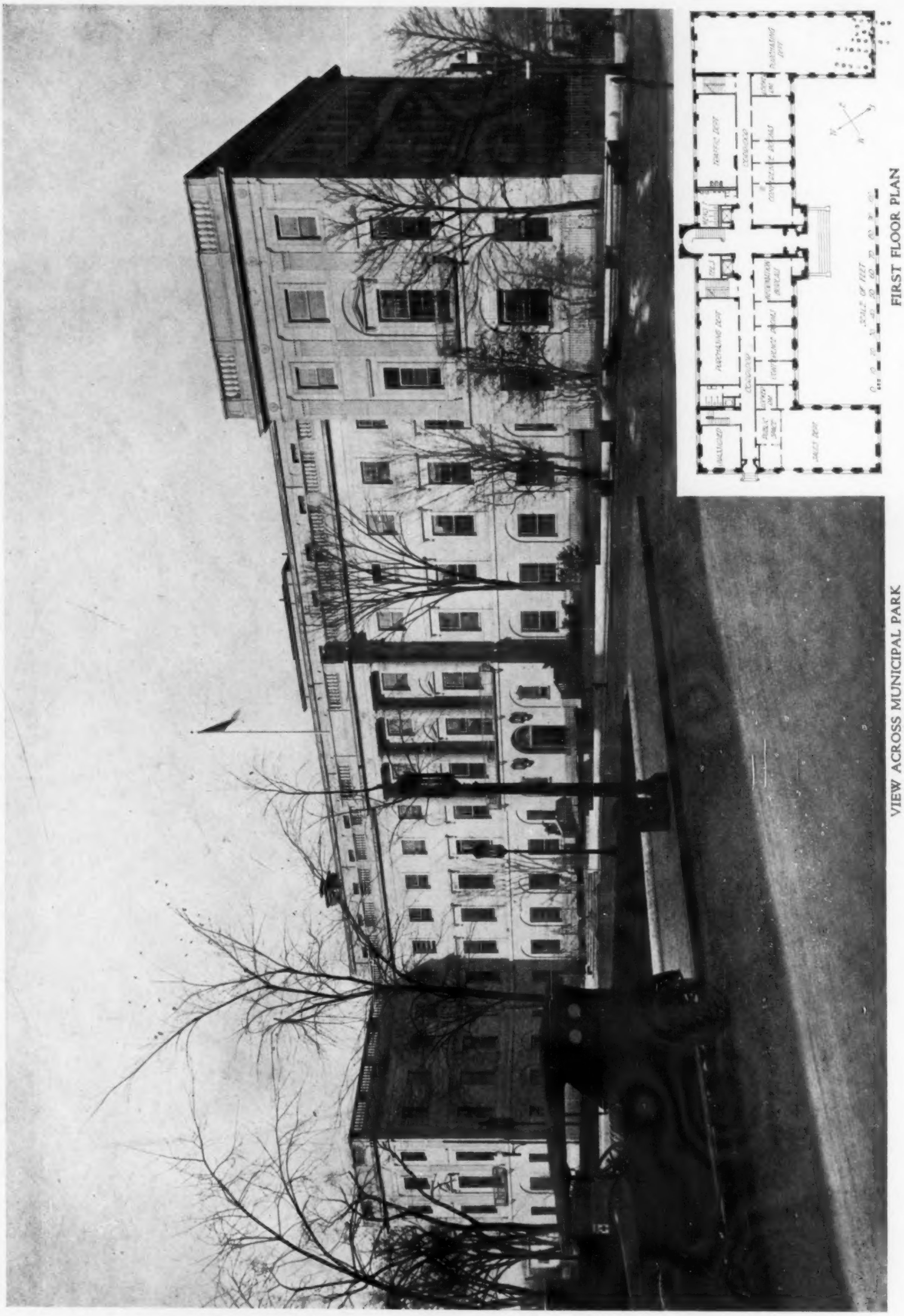
WATERBURY CLUB, WATERBURY, CONN.

CASS GILBERT, ARCHITECT

DETAIL OF FACADE

ENTRANCE DETAIL

WATERBURY CLUB, WATERBURY, CONN.
CASS GILBERT, ARCHITECT



FIRST FLOOR PLAN

VIEW ACROSS MUNICIPAL PARK

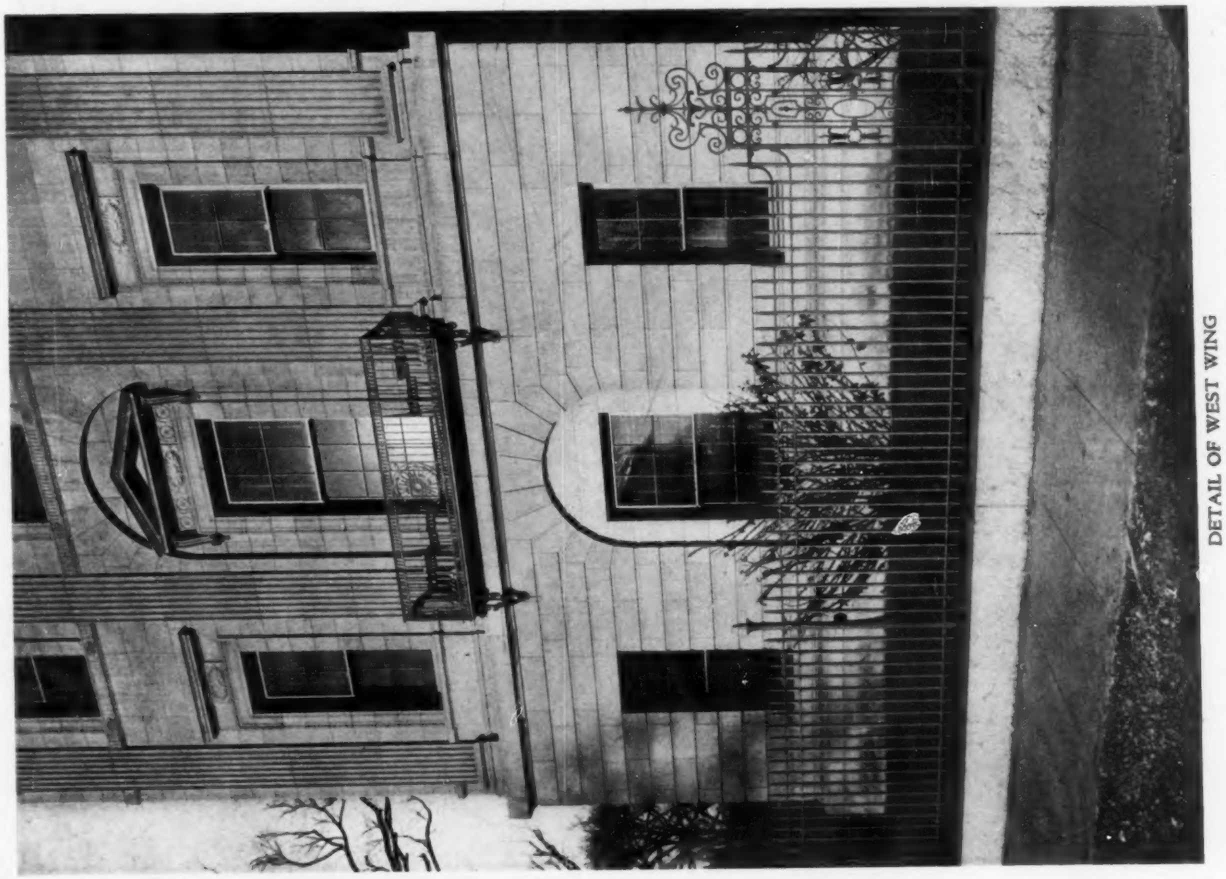
OFFICE BUILDING OF CHASE COMPANIES, INC., WATERBURY, CONN.

CASS GILBERT, ARCHITECT

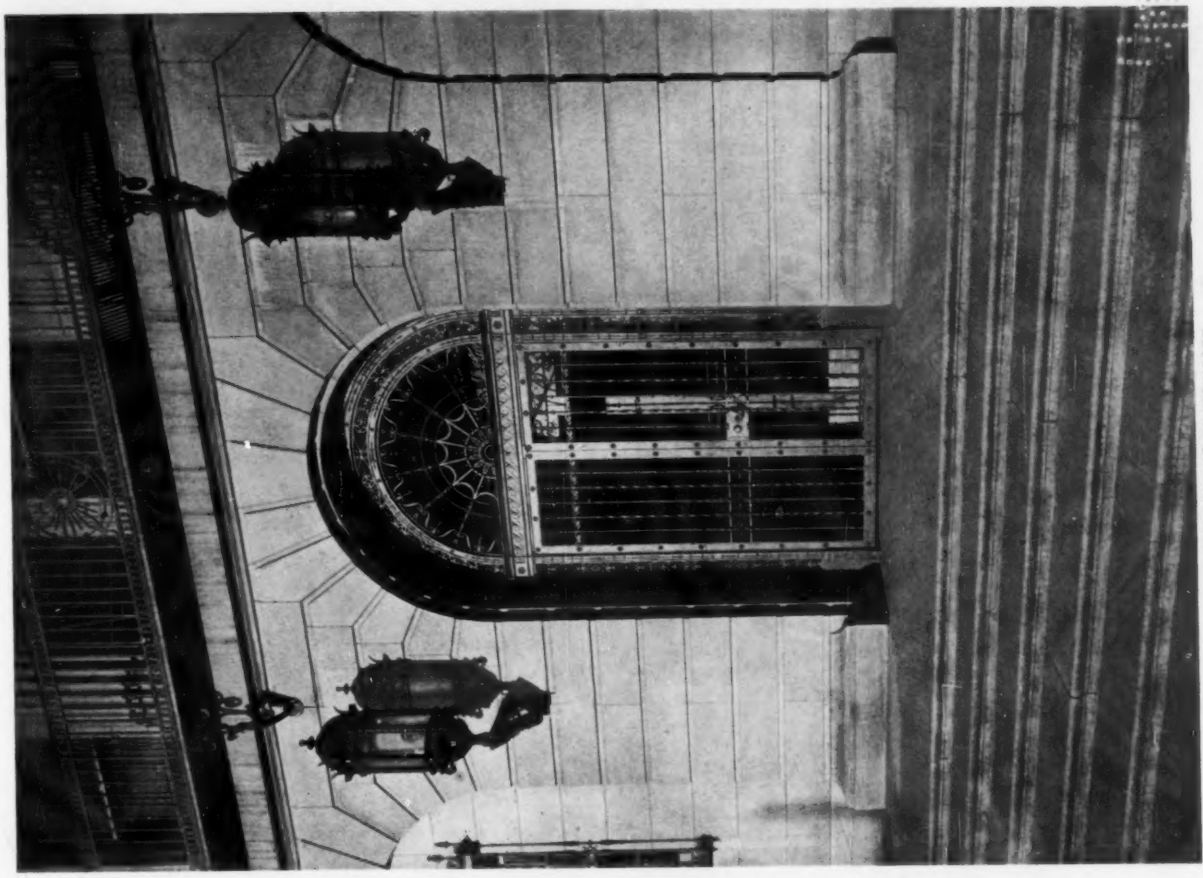
DETAIL OF CENTRAL FEATURE

OFFICE BUILDING OF CHASE COMPANIES, INC., WATERBURY, CONN.

CASS GILBERT, ARCHITECT



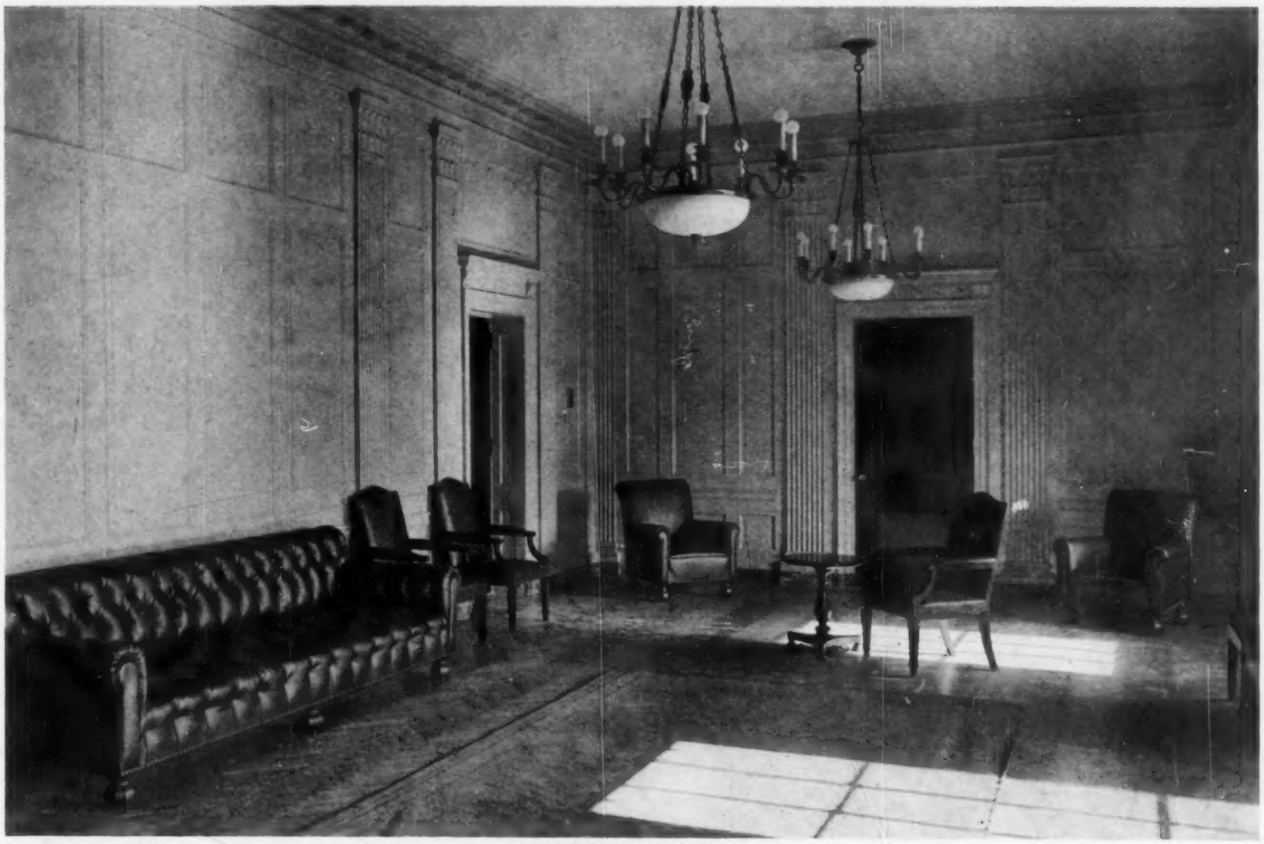
DETAIL OF WEST WING



DETAIL OF ENTRANCE

OFFICE BUILDING OF CHASE COMPANIES, INC., WATERBURY, CONN.

CASS GILBERT, ARCHITECT



CONFERENCE ROOM

EXECUTIVE OFFICE

OFFICE BUILDING OF CHASE COMPANIES, INC., WATERBURY, CONN.

CASS GILBERT, ARCHITECT

Two Buildings at Waterbury, Conn.

CASS GILBERT, ARCHITECT

OFFICES OF THE CHASE COMPANIES, INC.

A FEW years ago there was erected in Waterbury, Conn., a city hall from the design of Cass Gilbert, architect, that has proved a most successful building. On the completion of the city hall the property opposite was occupied by an undignified brick dwelling and a one-story block containing a garage and an undertaker's establishment. Adjacent to the new municipal building was the Bronson Library and Library Park.

The late Henry Sabine Chase, president of the Chase Companies, Inc., and a public spirited citizen, conceived the idea of a civic improvement and purchased the property facing the city hall. The undesirable buildings were razed, and Mr. Gilbert was engaged to design a building to house the administrative forces of the several organizations comprising the combined Chase Companies.

The general characteristics of style and detail, the accented lines of height with crowning balustrade and a similar lower story with flat headed windows in the reveals of a rusticated arcade, are carried out in the new facing building. As a balance to the wide entourage in front of the municipal building, the Chase structure stands well back on a flat lawn with a deep-set central façade between projecting wings.

The main entrance approached over a wide paved walk carries circulation east and west from the foyer and principal stair hall through middle corridors to the wings. The first floor is occupied largely by the offices of the parent organization—The Waterbury Manufacturing Company. The entire wing on the right end is taken up by the purchasing department of the combined Chase Companies, while the main front is given to reception or conference rooms. There are elevators to all floors and four stairways to the second story. On this floor are located the offices of the president, treasurer, secretary, managers and sales and production department of two of the companies, general filing room and a large conference room. On the third floor, reached by two stairways at either end, are the combined accounting departments, the records department, cashier and pay department, with their vaults, and the cost and compensation departments. The fourth story front is slightly back of the main façade line and does not extend over the area of the wings. This floor is mainly devoted to welfare work, although photographic equipment occupies some area.

The exterior of the building is Indiana limestone, with grilles, lamps, balconies and surrounding fence of iron. The interiors are simply treated with elaboration of detail only at principal points. The floors of the first and second story hallways are of Tennessee marble. The main door trim, stair rail, radiator grilles and fixtures are bronze. In the private offices of the administrators, mahogany finish and paneling are used. The large working spaces are finished in enamel with simplest detail, giving the maximum in sanitation.

View Across Entrance Court of Chase Companies' Offices

Vestibule, Chase Offices

THE WATERBURY CLUB

WHILE a comparatively small establishment, this clubhouse ranks with the finest of its kind throughout New England in its plan and appointments.

It is located on the edge and overlooking Waterbury's historical green and carries in its façades a note of the more pretentious Colonial examples of this section of the States. The details of exterior and interior are quite decidedly the Georgian architecture of the colonies — notably the doorways, the attenuated porch columns, the type of brickwork, and the mantels and trim within. The main façade, aside from being ideal in its conception for club purposes, is fortunate in never lacking interest.

On entering by either front entrance a corridor parallel with the front leads to a central lobby and office. On the left and right at the rear are the bar and toilet facilities. On the front of the building between entrance halls is a large billiard room, and at either end, each occupying an entire side, are the lounging room and the upper part of the gymnasium. A curving stairway opposite each entrance leads to the upper floors.

The second floor has two dining rooms at opposite ends — that at the right with adjacent rooms being for the use of ladies. The rear of this floor is given to the kitchen and service department, while at the front of the transverse corridor are card rooms and a library opening on to a balcony.

The third floor is entirely devoted to bedrooms, and the fourth floor is occupied by the steward's apartment and employee's rooms. In the basement, besides the heating plant and gymnasium with its lockers, there are two squash courts, a bowling alley, baths and a masseur's room.

The members' common rooms depend upon moulded surfaces for their embellishment, with the exception of a sparing employment of Adam ornament. The deep cornices, tall Doric columns with plain shafts, and modest trim, all present an atmosphere of comfortable, dignified repose.

Municipal Building, Waterbury, Conn.
Cass Gilbert, Architect

DEPARTMENT OF ENGINEERING & CONSTRUCTION

CHARLES A. WHITTEMORE, *Associate Editor*

The Automobile and the Private Estate

PART I. THE EFFECT OF AUTOMOBILES ON ROADWAYS AND FORECOURTS

By TYLER STEWART ROGERS

THE last quarter century has witnessed the most remarkable modification of social and economic life by a mechanical invention of man that the world has yet seen. It is very reasonable to doubt whether another invention will ever exert the universal influence which the automobile has had on the history of civilization. Practically every phase of our social existence has been modified by the development of the automobile, and some have been almost revolutionized.

Changes have come so rapidly that many necessary or desirable modifications of existing conditions have not yet been recognized, and we have been satisfied with makeshifts for a number of years. This has been largely due to the constant changes in automobiles themselves, which until recently have been so numerous as to make questionable the stability of the present character of motor vehicles, and to make their ultimate character a moot question. Naturally fundamental changes in the design of buildings and roadways for automobile use have always lagged behind and will continue to do so until people are convinced that the design of motor vehicles has reached a point where future developments will not greatly modify their requirements as to space and road character.

The recent war has done much to convince people that the automobile as now developed is practically stable. Under pressure of military necessity, mechanical inventions were perfected to their utmost, and wonders were achieved in many branches. Aviation moved ahead very swiftly, yet automobiles changed but very little in their fundamental character. It is interesting and significant to note that the perfection of motive powers for aviation purposes did not materially alter the character of motive powers for automobiles. This has been sufficient proof to many people that the present design of motor vehicles is stable, and that although many improvements are still possible, there is little probability of their greatly affecting the character of the vehicles as we know them to-day.

The time has come, therefore, when we may consider how greatly automobiles have affected our lives and our structures, and we may now move with some assurance towards making desirable modifications of our structures (our lives seemingly having adapted themselves unconsciously) to further the convenience and usefulness of this new method of transportation.

The success of automobiles has increased the popularity of suburban homes and country estates by making them more accessible to each other and to the cities. The reverse is not entirely true, that the growth of estates has fostered the development of the automobile, for large estates have existed since pre-Roman times, and their popularity and numbers showed no marked increase until after the automobile became a practical vehicle. The two owe much to each other, nevertheless, and hence it is strange that estate design has not recognized the requirements of automobile traffic and storage more rapidly.

Automobiles have certain well defined characteristics common to all makes. The largest automobile is only about one-third its length longer than the smallest car. The gauge of all passenger cars varies only an inch or two, and by far the greatest number are all of one dimension. The overall width of all pleasure cars is very nearly the same. Few cars exceed 8 feet in height, and yet practically all enclosed cars require at least 6½ feet or more clearance. The greatest variations in automobiles come in their weight and in their turning ability; but even here the extremes only vary about 100 per cent, and the minimum figures have little effect on the design of roads or garages. Finally, all automobiles turn in the same manner and increase their gauge on corners in about the same proportion to their wheelbase.

Driveways, modified or designed for automobiles, have curves of long radius, and the curves are not "blinded" by the presence of obstructions to a clear view for a considerable distance. Higher traveling speed and greater inertia than horse drawn carriages require that the driveways be designed for greater safety. Entrance gates are now set well back from the public road associated with some form of entrance court permitting a junction of the private driveway and the road, having curves of very liberal radius. Forecourts or other forms of turn-around for automobiles are of greater

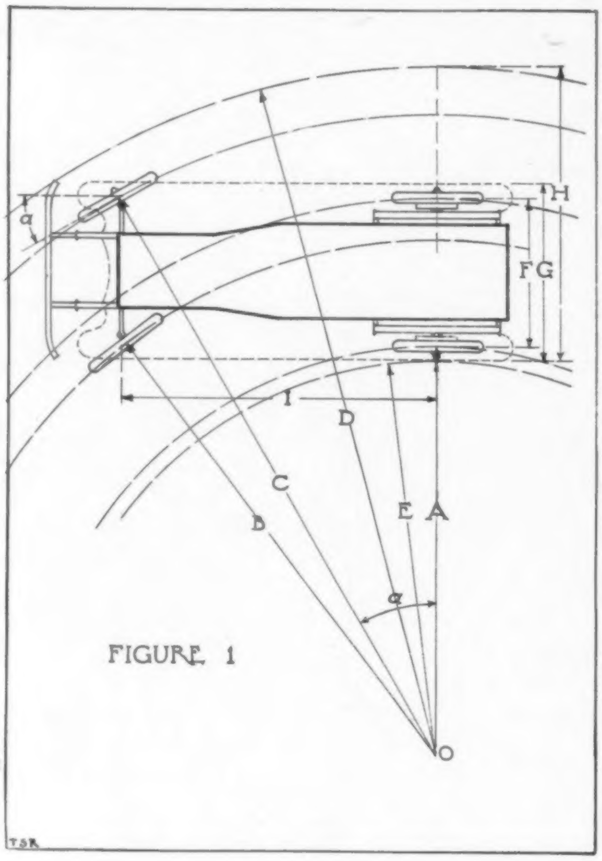


FIGURE 1

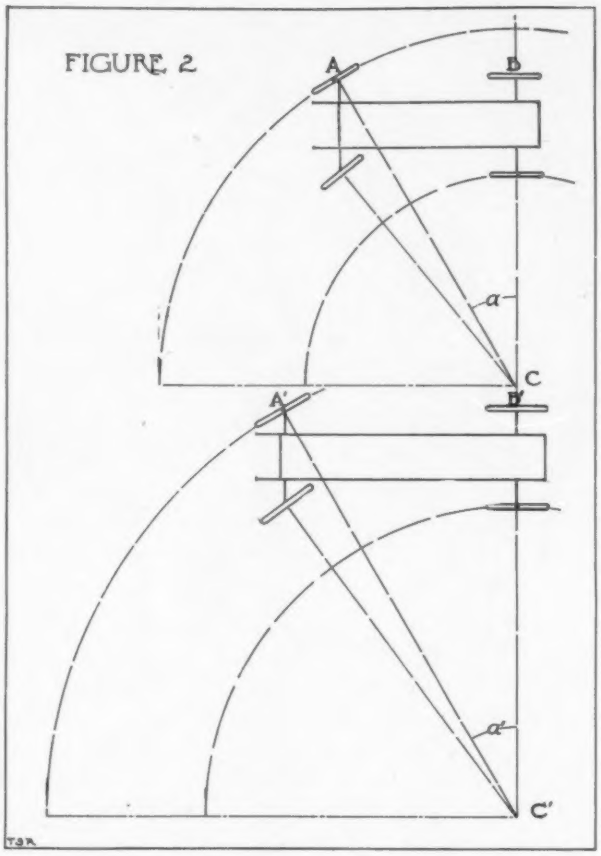


FIGURE 2

size than formerly, because the turning ability of motor cars has established fairly definite minimum dimensions and economical shapes which are greater than those required in earlier days.

Service areas, which include areas adjacent to the service portion of the house used for the delivery of supplies, as well as areas adjacent to the garage, stables, or other service buildings, have been similarly modified by automobile developments. In this case, however, the requirements of the light delivery motor truck are paramount for house service courts; while passenger vehicle requirements generally govern service areas at the garage. Heavy truck requirements need not be considered in estate design except in the width of gateways, the clearance of overhead obstructions, and the strength of bridges, for otherwise these trucks enter an estate so seldom as to make other special provision for their extreme dimensions a needless expense.

The garage is a feature introduced by the automobile itself, hence it is to be expected that garage design should by now have reached a fairly high degree of refinement. On the contrary, garage design still leaves a great deal of room for improvement, notably in matters of doors, ventilation, drainage, heating and equipment. Most of the problems have been solved, but both architects and owners have overlooked the importance of many of the improvements — the former for no apparent reason, and the latter because they fear there is great expense attached to refinements.

Automobiles have introduced another feature not hitherto recognized as a unit in estate design; namely, the parking space. Entertainments at country estates are frequently on a fairly large scale. Locations remote from public garages, public parking spaces, or from the guests' own estates, make essential some provision for parking the guests' cars during entertainments. Remote locations increase this necessity because the automobile has almost entirely displaced the electric car and the train for transportation to such functions, even when they are readily accessible.

In studying the actual effect of automobiles on estate design, it is of primary importance to understand the automobile itself, and how it differs from animal drawn transportation. Briefly stated, the major difference is entirely concerned with the turning ability of the motor car.

The front wheels of an automobile do not turn with their axle about a king-bolt and fifth wheel as in the case of carriages, but turn on pivots at the ends of a fixed axle. Figure 1 is a diagram showing this method of turning. The center of the curve described is approximately on line with the line of the rear axle extended. The front wheels described two circles of different radii) B

and C, Fig. 1), and hence the angles they form with the line of the body are different. This difference in angle is provided for in practice by a peculiar relation of the steering knuckles based on what is known as a modified Jeantaud diagram. Similarly, the rear wheels describe circles of different radii which is provided for mechanically by the use of a differential. All four wheels, therefore, have different radii from the common center, the extremes being the radius of the inside rear wheel (A, Fig. 1) and the radius of the outside front wheel (C, Fig. 1). It should be especially noted that the difference between these extremes (H) is considerably greater than the gauge of the wheels (F). Hence an automobile, while turning a corner, requires a wider roadway than when moving in a straight line. The normal track or gauge of automobiles is 56 inches, while the extreme track width on curves of minimum radius varies between 7 feet and nearly 9 feet — a matter of considerable importance where minimum road width is required. Furthermore, the actual clearance of all parts of the automobile from the fender on the inside to the bumper or other projection at the front on the outside (as at D, Fig. 1) is considerably greater than these figures.

Inasmuch as the maximum angle which the front wheels form with the center line of the body is limited by mechanical difficulties, such as width of engine frame and the design of the steering mechanism, the turning ability of automobiles is governed mainly by the length of their wheelbase. A car of short wheelbase can turn in less space than a car of long wheelbase, and takes correspondingly less width of track on the curve, as shown in Fig. 2. This diagram shows two automobiles drawn to the same scale, one having a wheelbase of 100 inches and the other having a wheelbase of 132 inches. The angle which the outside front wheel makes with the line of the body is the same in both cases. The angles a and a' being equal, the triangles ABC and A′B′C′ are similar, and, therefore, the lengths of the sides are proportional. Hence for equal maximum angles of the front wheels the minimum turning radius is directly proportional to the wheelbase (allowance not being made for the slight errors resulting from the movement of the wheels about their pivots).

Entrance driveways and other roads of limited width should, therefore, be made appreciably wider at turn-arounds and on curves of short radius when there is any possibility of two cars passing each other at such places. A road surface only 6 feet wide is sufficient for a good driver to keep to on straight runs, but all the skill in the world will not keep a car on a 6-foot surface at a sharp turn.

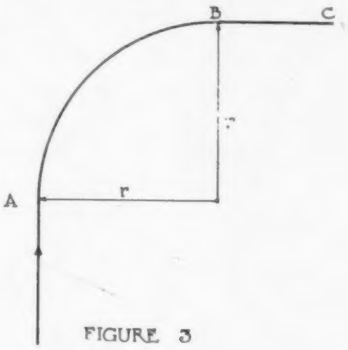


FIGURE 3

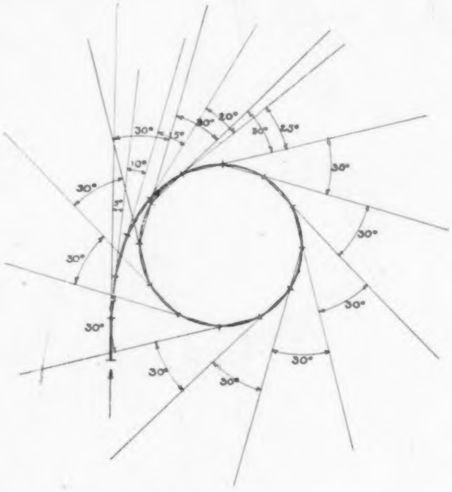


FIGURE 4

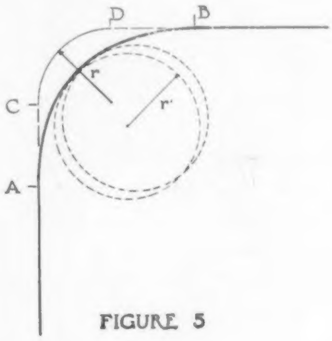


FIGURE 5

The curve described by an automobile is seldom the arc of a circle — a fact frequently overlooked in the design of roads and turn-arounds. The arc of a circle requires a constant radius throughout the movement, which would mean that the front wheels (and hence the steering wheel) would have to be held in the same position throughout the curve. To accomplish a circular curve such as is shown in the diagram (Fig. 3), the driver would have to come to a full stop at point A (the point of curvature) and there turn his front wheels the required amount to produce the curve of radius r. At point B the car would again be stopped, the wheels straightened out, and the car started again on the line BC. Such procedure is, of course, ridiculous, yet it is worth emphasizing because so many designers use their compass with very little thought in laying out road curves.

The curve actually described by an automobile making a turn in one direction is similar to a parabola or the "transition spiral" of railroad engineering. It is seldom a mathematical curve in practice as the driver does not turn his steering wheel in any fixed relation to the speed of his machine. Were the steering performed by a mechanical process so that the degree of curvature

increased an equal amount for each unit of distance covered by the machine, a curve such as shown in Fig. 4 would be described. When the maximum angle of the front wheels was reached the car would thereafter proceed in a true circle. For purposes of illustration only this diagram was developed by assuming that the outside front wheel was turned 5 degrees to the right in each unit of distance through which the automobile moved. A maximum angle of 30 degrees was assumed. This figure illustrates the type of curve which all automobiles describe in their movements; hence a curve of this character should be used in the study of road design instead of using the arc of a circle.

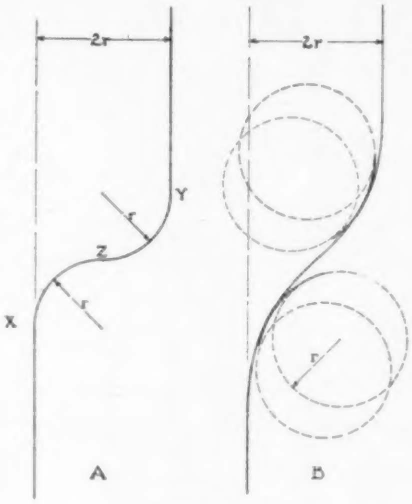


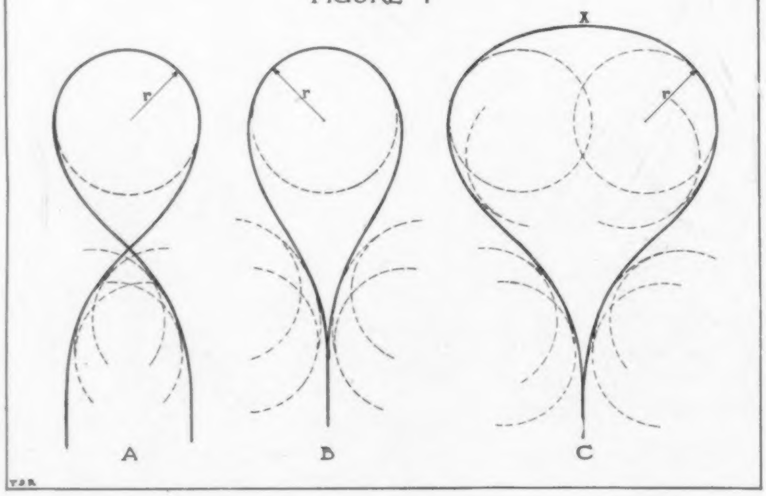
FIGURE 6

Figure 5 shows this curve used twice to produce the shape of the path of a car turning between two tangents at right angles. At A the driver begins to turn his steering wheel, continuing the movement to the center of the curve and then reversing the movement steadily until point B is reached. The dotted circles show the complete curves taken from Fig. 4. It should be noted that unless a process is followed such as described for Fig. 3, the curve of minimum radius is not quite reached while making a 90 degree turn. For comparison a turn of minimum radius throughout is shown at C-D in Fig. 5.

Reverse curves have also been badly designed because of the same fallacy in the minds of designers that automobiles describe arcs of circles. A curve similar to that shown in Fig. 6 at A is open to the same objection that was developed in the case of Fig. 3, with the added difficulty that at point X the driver would have to turn his wheels from their extreme angle to one side to their extreme angle towards the other side. At B in Fig. 6 is shown a reverse curve of the type normally described by a car making a crossover of the same distance. Parts of four units are used to develop this curve. Other reverse curves are possible to an infinite number, depending on the degree of movement which takes place before the reverse process sets in. It must be remembered that if an angle of say 15 degrees is reached to the right, the process must be reversed through 0 degree to 15 degrees to the left, there being a point of straight travel between the parts of the curve. Figure 6A provides no such transition.

Since the turn-around is the principal problem of estate designers, the curves shown in Fig. 7 are of especial moment. At A is shown a turn using the minimum radius *r* as the outside limit of the roadway. The result is a crossover. At B is shown a turn using the same radius as far as possible, but returning to the original line of travel. This figure shows that the automobile requires a space somewhat wider than its turning radius would indicate to make a complete turn. At C is shown a turn frequently required in forecourts where it is desired to stop at a doorway or at steps at the head of the curve X. In order to bring the car close to the curb it must straighten out as much as possible, which movement requires a total width of turning space nearly four times the minimum radius.

These curves are plotted mathematically without reference to actual dimensions and, therefore, are to be considered only as diagrams. By changing the ratio between the speed of travel and the rate at which the degree of curvature is inscribed, curves of infinite variety may be produced. These ideal curves are the basis for the best design for actual practice, for they involve a regular rather than an erratic movement of the steering wheel to negotiate them. It is easier for a driver entering a forecourt for the first time to steer his car with a smooth movement than to judge the erratic swing necessary to accomplish a poorly designed turn.

FIGURE 7


Heating and Ventilating

PART II. VAPOR SYSTEMS

By C. W. KIMBALL

THE simplest system of vapor heating is the one that has a supply valve on each radiator with only a union elbow on the return of the radiator, the supply valve being adjusted to the amount of steam its radiator will require. In this way each radiator is supplied with only enough steam to fill it, allowing none to go into the return, and thus only water of condensation and air escapes through the return and vent pipes to the boiler or atmosphere. The success of the system depends on the proper regulation of the supply valves and the proper pitch and dripping of the piping system. If the supply valves are not properly regulated, steam will go out into the return pipe and prevent other radiators from heating properly.

In any vapor system, hot water type radiation should be used with the steam supply at the top or bottom of the radiator and the return from the bottom at the opposite end. The radiation should be figured 20 to 25 per cent larger than for pressure steam systems, and the supply pipes should be planned to be large and evenly graded with the flow of steam and water, with no pockets, and should be dripped often enough to prevent any water or air accumulation. The returns should be run at a true pitch and should be 3 or 4 feet above the water line of boiler if possible. (See Fig. 1.)

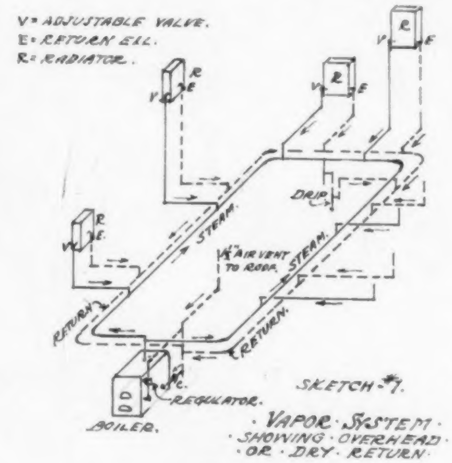


Fig. 1

If the returns are near or below the water line of the boiler, an additional air-vent line, 1 inch or 1¼ inch in size, should be put in above the water line and connected with each return coming down from above and should be carefully graded upward to vent the system to the atmosphere. (See Fig. 2.)

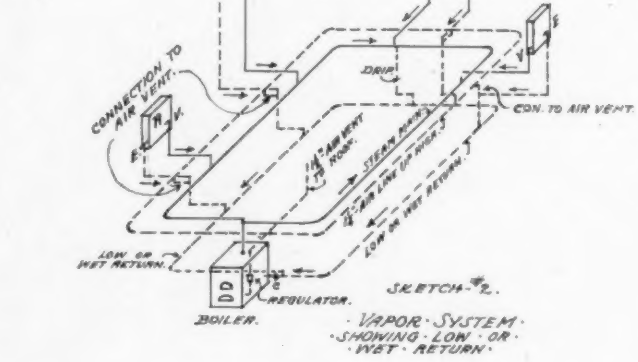


Fig. 2

Other vapor systems have the same general piping scheme and radiation, but have non-adjustable supply valves and include either a water seal, thermostatic or float trap, or a weighted check valve on the return connection of each radiator to permit air and water only to pass into the return system with air-vent pipes to the atmosphere. Some systems have a vapor-vent plug (a brass plug with a very small hole through it) in each radiator to assist in freeing the system of air. Other systems have special return valves which will allow air and water to escape from the radiators to return pipe, this return pipe being vented to the atmosphere and having a special vent valve which allows air to escape, but does not permit the air to draw back into the system as the steam condenses. This feature makes possible, at times, 6 inches to 10 inches of vacuum on the entire system, thus tending to make vapor leave the heater at a temperature of water less than 212 degrees and to heat farther than is otherwise possible.

Vapor systems are especially adapted to residences, small schools, churches, hospitals and other buildings where heating demands are not too extensive.

Vented Return Modulation System

This system is piped and equipped the same as the vacuum system described below and having the same supply and return piping as the vacuum system, with a graduated action supply valve preferably at the top of each radiator and a vacuum valve or trap on the return connection from each radiator and each drip.

The return piping system carries air and water back to a point near the boiler or receiver where the returns are vented to allow the air to escape.

If it is desired to carry two or more pounds steam pressure on the boiler and on the supply system, the

returns having no pressure must be put back into the boiler through some automatic device such as return traps, pumps or alternating receiver as, due to the design of the system, the pressure on the boiler side at this time is greater than on the return system, and the water obviously cannot return to the boiler by gravity,

This system is used many times on large buildings of all kinds where something more positive is desired than the regular vapor system and where vacuum pumps do not seem to be required.

Low Pressure Steam Gravity Return System

This heading covers a heating system, the main parts of which are boilers, steam flow and return mains, radiators with shut-off valves on each radiator connection and with air valves on each radiator coil, or indirect.

The variations of this system are:

1. One-pipe circuit system: a system in which there is only one pipe, this pipe being the supply and return combined, extending around the building below the radiation with one-pipe connection to each radiator. With this system the combined steam and return main is extended to a point beyond the extreme radiator and connected to a return main, which is carried to a boiler, trap or other outlet.

2. One-pipe down feed system: a system in which the steam main is in the attic or above the radiation and the various supplies to radiators drop down through the building with a single connection to each radiator, the pipe then extending to the basement. The steam flows into the radiators through this pipe and the condensation flows back through it. The bottoms of these drop risers are connected together into a return pipe which runs back to boiler or other source of heat.

3. One pipe underneath feed system with a basement return: a system of heating having a supply main in the basement with one-pipe risers up to radiators with only one connection to each radiator. In the basement each of these risers is dripped and these drips are connected together to the return main to boiler or source of heat.

4. Two-pipe underneath feed: a system where the steam and return mains and risers are separate and independent, with the supply connected to each radiator and a return connection taken from the return end of the radiator down to the return main in the basement, each radiator thus having a supply and a return valve and also an air valve.

5. Two-pipe down feed: a system where the steam mains are in the attic, on the roof, or elsewhere above the radiation, and the steam pipes drop and feed radiators; while the return risers start at each radiator and connect together in the basement. The drop steam risers are also dripped below the last radiator connection into the return main. There are air valves on each radiator.

6. Three-pipe system: a system having the same principal parts as Nos. 4 and 5, and, in addition, an air valve on each radiator connected into air-vent risers, which drop to a main extending entirely or partly around the building and which carries the vented air to the atmosphere.

Gravity steam systems are adapted to most, if not all, classes of building work, if properly designed.

Paul System

Briefly stated, this system is the same as the No. 6 described above, having the air valves connected together into an air main and this pipe extended back to some central point where some form of pump or other exhauster is installed, to draw the air out of the radiators through the air valves and air line and by this suction hasten the circulation of steam throughout the whole system. Each air valve used on this system is designed to be adjusted to allow the air to pass through and to shut tightly by expansion when steam strikes it.

Vacuum System

This system has the same main features as the gravity steam systems with the steam and return distribution approximately the same as the two-pipe low pressure steam system, but having the return connection from each radiator and each drip point equipped with a vacuum valve or steam trap, this device designed so that water and air only can pass through it on into the return, the valve closing automatically when steam strikes it. From these valves the returns are collected and extended to a pump which is designed to create a suction on the return piping, thus drawing to the pump all water of condensation. The pump delivers the water to the boiler or to a receiver after separating the water and air.

The vacuum system does away with all air valves, makes possible smaller steam and return mains, especially in large systems, and in cases where exhaust steam from engines is used the back pressure in the engine cylinder is reduced. The system makes possible the partial heating of any radiator, prevents to a great extent snapping and cracking in the piping and radiation, and makes possible placing radiators below the main return line of the system if desired.

Vacuum systems are adaptable to almost all large heating propositions which occur.

Italian Renaissance Details

A COLLECTION OF MEASURED DRAWINGS BY WILLIAM D. FOSTER

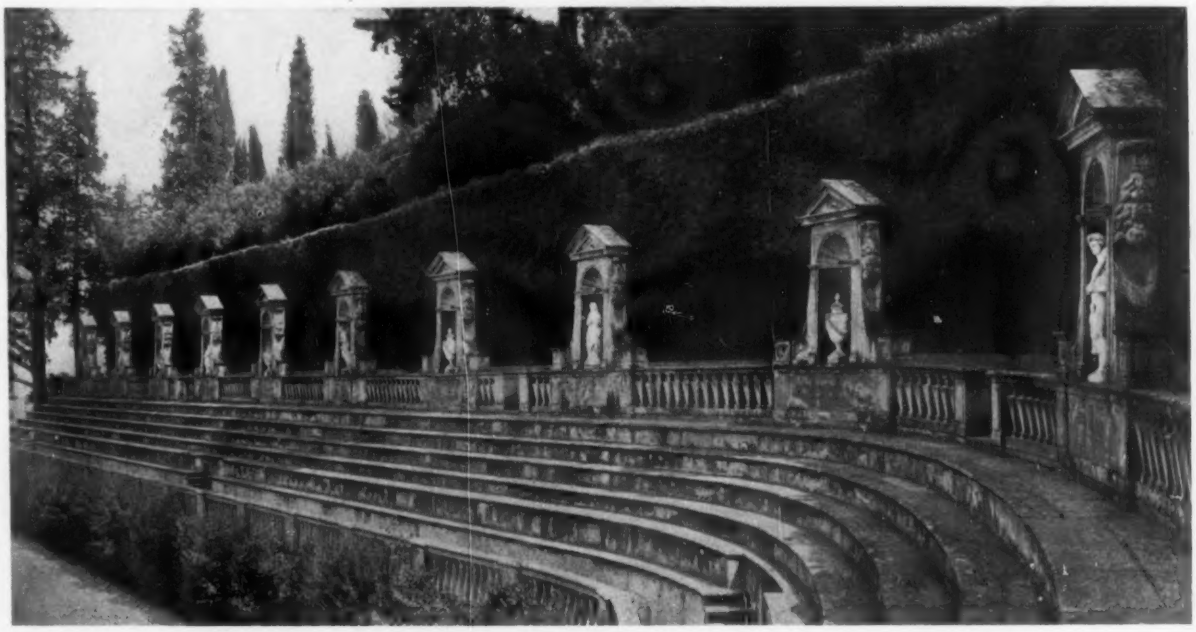
THE detail of the Broletto at Brescia is of one side of the courtyard. The main parts of the building were built during the thirteenth century, including the very fine Gothic tower. The latter part of the sixteenth century one side of the court was built up with the arcade on the first story and a colonnade above as shown in the detail, forming an entrance to a group of rather monumental rooms which are in active use to-day as the quarters of the courts of justice.

The finish of the stone piers and arches is particularly successful, the bases and impost blocks having a definite horizontal tooling, while the rest is a picked surface, the piers being rougher than the arches. The color of the stone is a warm brownish cream while the stucco above is a dull orange.

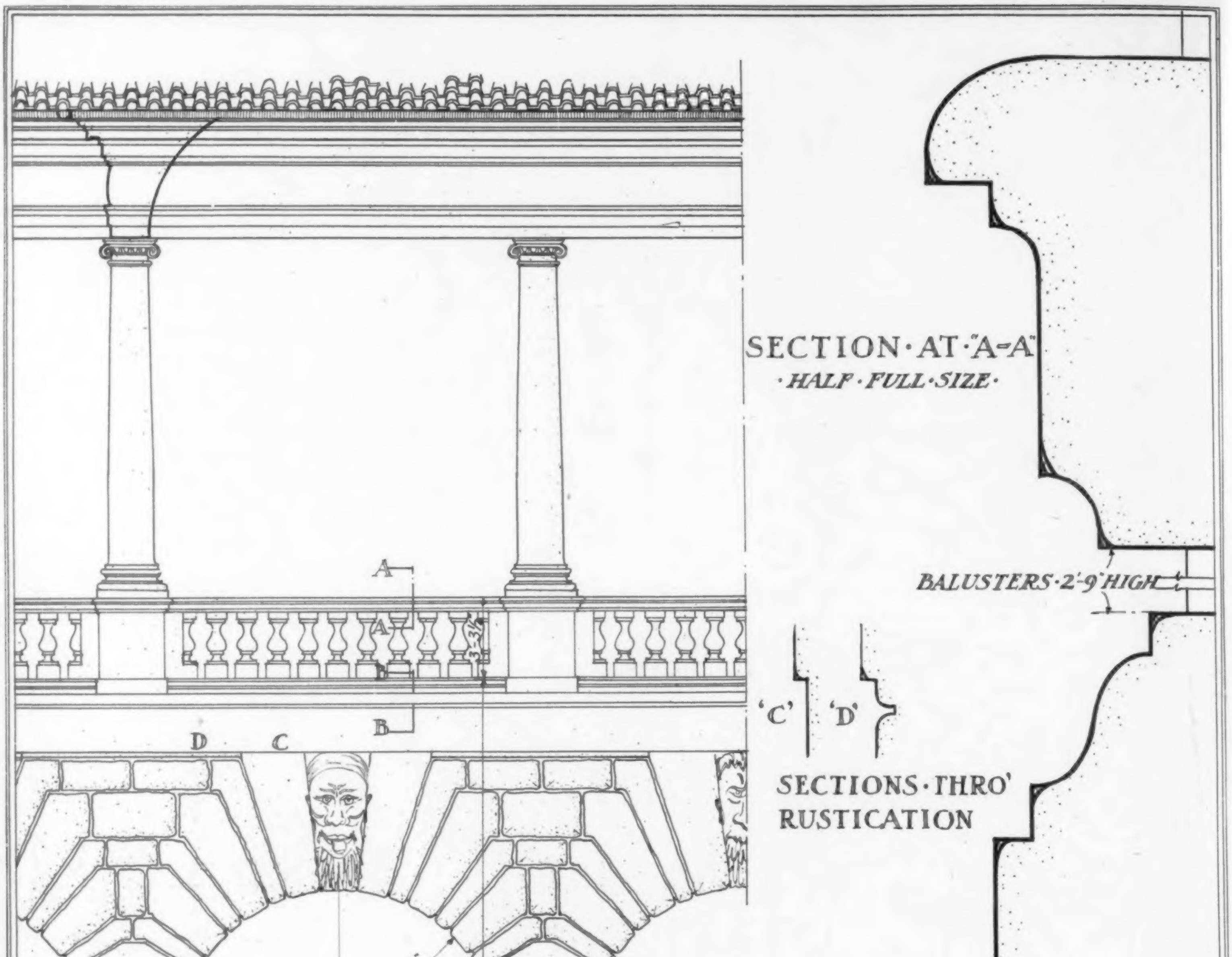
The motif from the Boboli Gardens is found in the amphitheater, which is directly behind the Pitti Palace, or royal residence in Florence, the long axis of the amphitheater being a continuation of the axis of the entrance of the palace. The amphitheater is elliptical or rather U shaped, the open end facing the rear façade of the building. A fine obelisk and a Roman sarcophagus have been placed near the foci of the arena. The amphitheater was formerly used for various festivals and pageants. The seats, or gradients which follow the U shape, lead up to a balustrade which is interrupted by the niche motif presented here. The particular beauty of the amphitheater is the silhouetting of these motifs in their warm cream stucco, quite spotted with lichen, against the background of the green of the garden. This forms a very interesting progression from formality to informality. Directly behind the architecture is a high hedge of trees well trimmed to give a deep, sharp shadow; behind this formal clipped line come some more or less formal trees, giving rather vertical lines; while finally back of these is the very informal massing of rough foliage, altogether one of the finest combinations of architecture and planting possible.

This amphitheater is open as a public park.

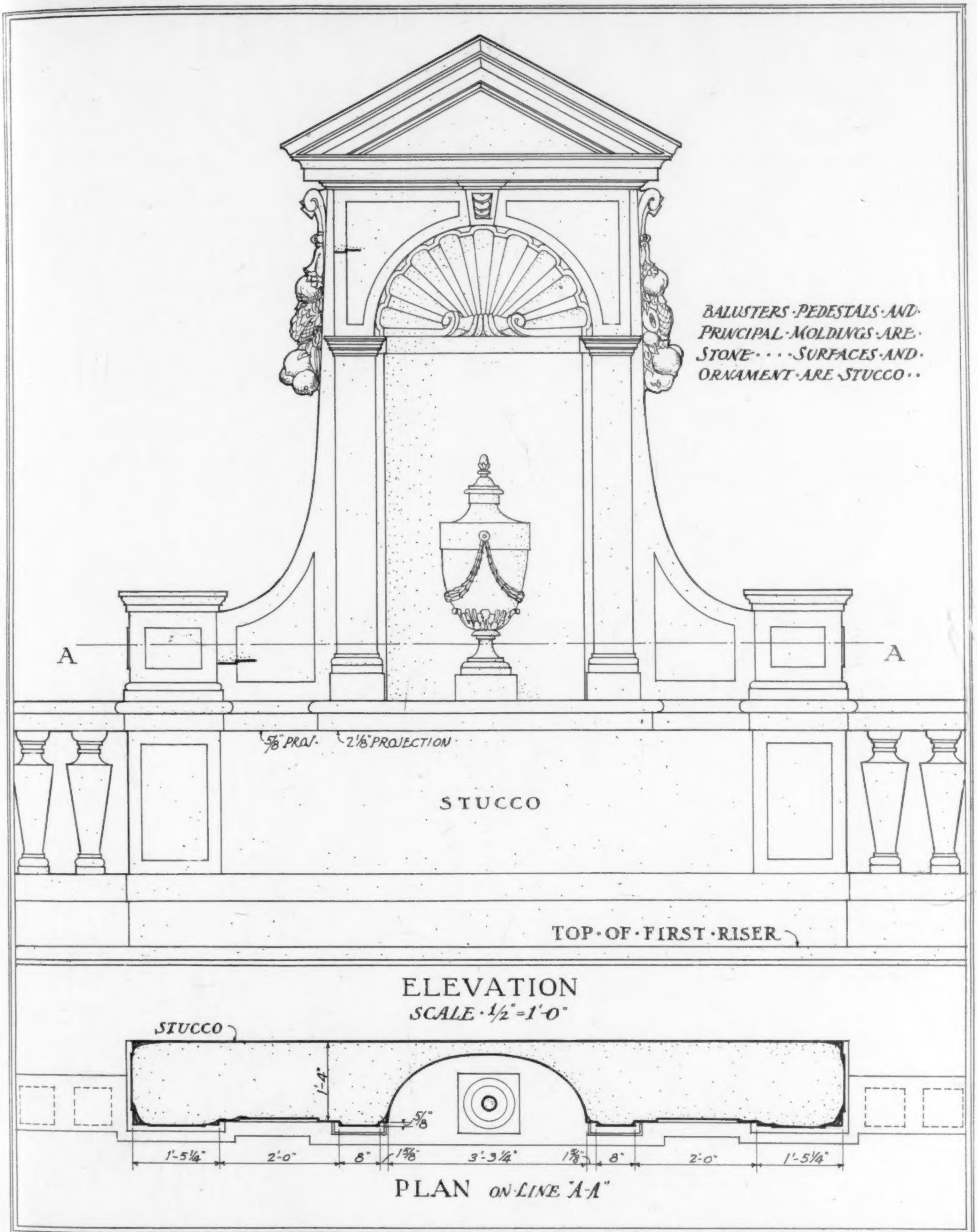
Courtyard of the Broletto, Brescia



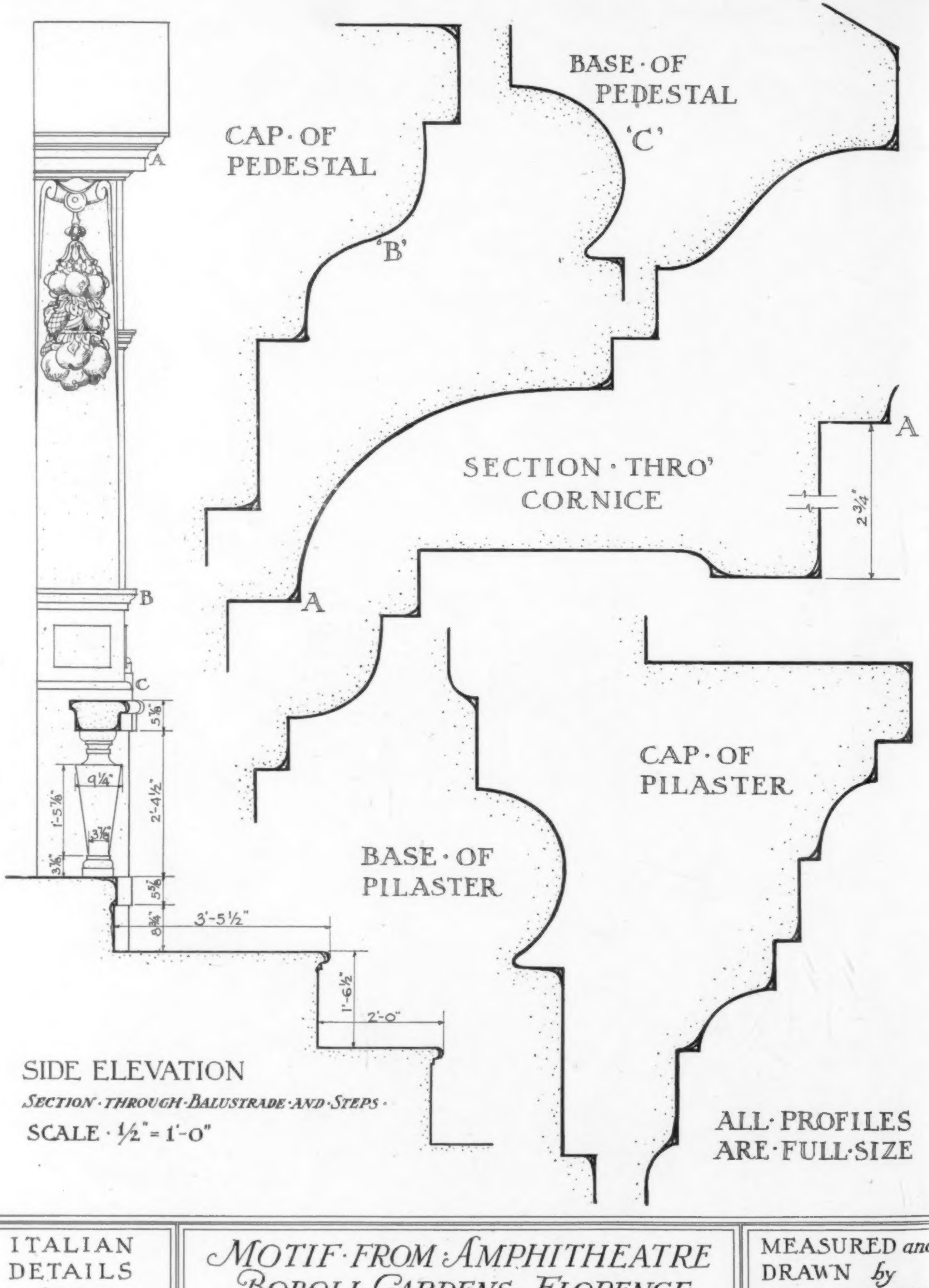
Amphitheater in the Boboli Gardens, Florence



ITALIAN DETAILS 1920	ARCADE·IN·COURTYARD OF·THE·BROLETTO·BRESCIA	MEASURED and DRAWN by WM·D·FOSTER



ITALIAN DETAILS 1920	*MOTIF · FROM · AMPHITHEATRE BOBOLI · GARDENS · FLORENCE*	MEASURED *and* DRAWN *by* WM · D · FOSTER



ITALIAN DETAILS 1920	*MOTIF · FROM · AMPHITHEATRE BOBOLI · GARDENS · FLORENCE*	MEASURED *and* DRAWN *by* WM · D · FOSTER

Notes on the Concrete Housing Conference

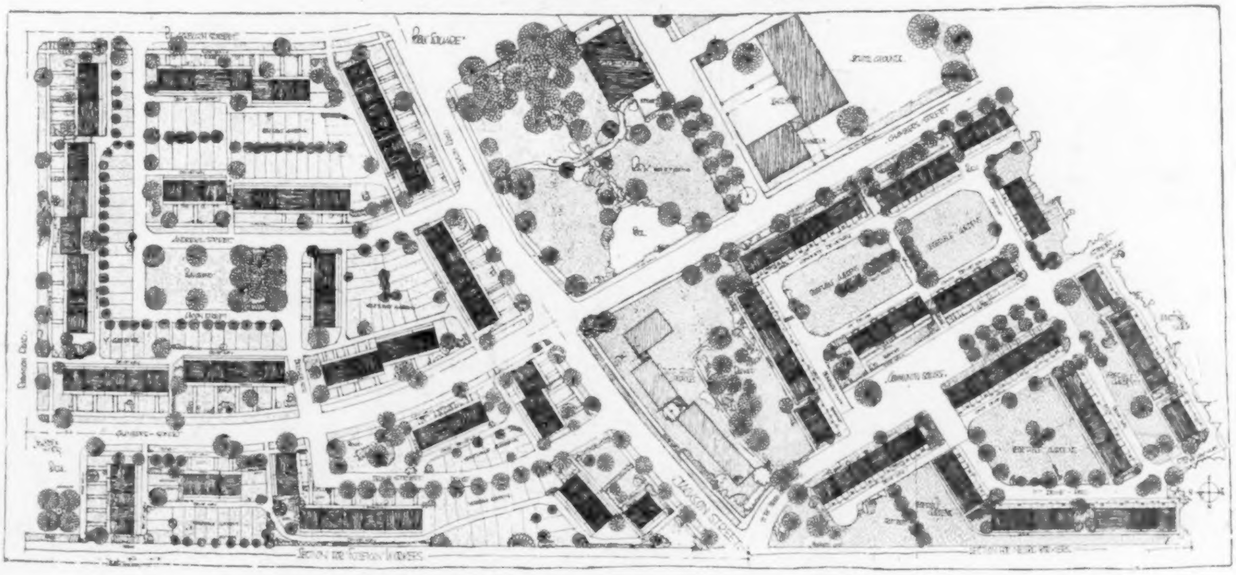
ILLUSTRATIONS OF CONCRETE HOUSING PROJECTS BY HERDING & BOYD, ARCHITECTS

A BUILDING material that imposes special conditions which affect the character of architectural design always holds an interest for architects. Cement as commonly used in concrete is such a material, and though it has not yet been used to any large extent in the building of houses, at least where it has received architectural treatment the expectation of gathering some interesting data in connection with its use for that purpose was sufficient to attract an appreciable number of architects to the Conference on Concrete House Construction held in Chicago in the latter part of February.

Concrete is universally recognized to-day as a good structural material, and it has made remarkable progress in this direction through the active interest of capable engineers in developing it in various systems of construction. From the standpoint of design, however, much remains to be done — in fact, except for isolated instances, it has not received the serious attention of the architect, and the majority of residence work executed in concrete has not added anything to our store of beauty, but has on the contrary introduced new elements of bad taste, such as the rock faced concrete block. This, however, is not to be wondered at, for all new materials have to pass through an era of development, the early stages of which are usually crude.

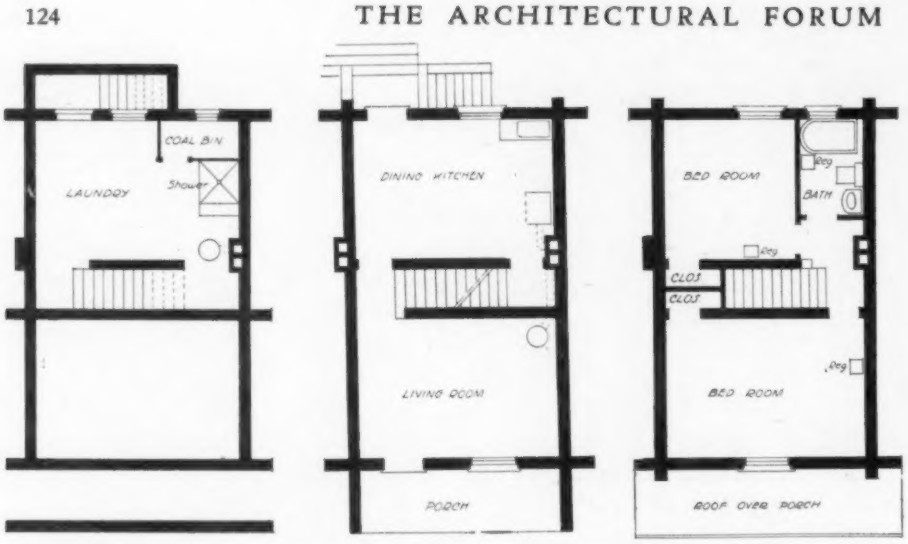
In the present days of shortage of building materials and the high price of skilled labor, every building material should be given the most careful consideration, so that no opportunities for developing inexpensive systems of construction for residential work will be overlooked. Concrete, undeniably, has an important contribution to make in this respect; a satisfactory system of using it in small units for the smaller types of building has not yet been devised, but that constitutes the problem at hand, and it is, furthermore, one which architects are especially able to help solve. The structural characteristics of the material must be recognized in the type of design, a certain degree of standardization must be worked out that will permit of speed and cheapness in construction without unduly hampering originality in design, and a system of forms with some elasticity that can be made available to the small builder are the chief essentials needed before concrete can be counted on materially to help the housing situation.

Detail of Semi-Detached Houses at Youngstown



Block Plan of Housing Development at Youngstown, Ohio

Herding & Boyd, Architects and Town Planners



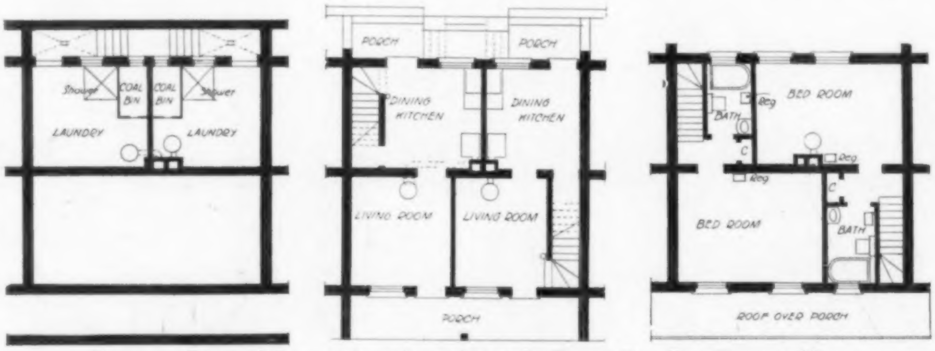
Basement, First and Second Floor Plans of Unit for Sixteen-Foot Frontage House

The conference was not productive of anything new in the way of construction or design. Its deliberations centered largely on the present economic conditions surrounding the housing question, and various resolutions were passed with the purpose of stimulating interest in building loan associations, priority of building materials as regards freight shipments, and other basic factors.

In a paper prepared and read by Irving K. Pond, F.A.I.A., some valuable suggestions were given relating to the development of concrete house construction from which the following are quoted:

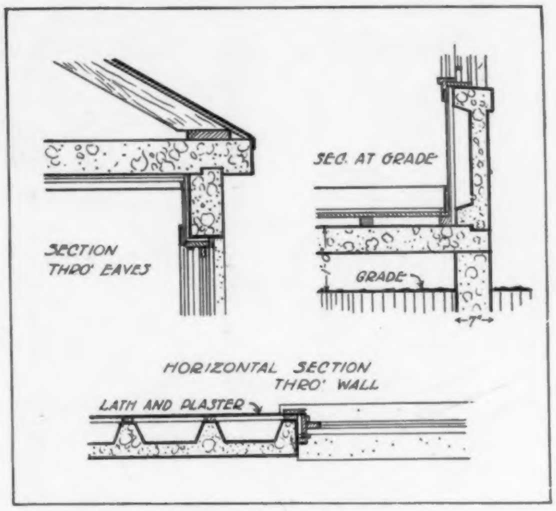
My first item of advice, if I may be permitted to offer advice to a body of men interested in the development of or handling a comparatively new and altogether worthy building material, is to treat the product with respect, to shun and scorn imitations, to recognize limitations, which attach to all materials as well as to all men, and to work within those limitations. This is not saying that because a thing has been done, and frequently and appropriately done in one material, it shall not be done in another or a new material which may be employed with equal propriety; however, the new material should not employ forms which are purely distinctive of the old, but should develop forms which inherently characterize the new.

Now concrete is a material which lends itself to many kinds of manipulation. So many are the possible methods of its application — such a diversity of means may be employed toward its legitimate ends — that some of its enthusiastic sponsors see in it a panacea for structural ills and possibly for æsthetic building ills. Therefore, it behooves those who can impartially survey the entire field to offer



Basement, First and Second Floor Plans of Unit for Twenty-Four Foot Frontage House

View of Typical Semi-Detached Houses at Youngstown, Ohio
Herding & Boyd, Architects



Details of Pre-cast Houses at Youngstown

both warning and encouragement — encouragement in its legitimate use, warning against its too free employment especially where other materials may better serve the conditions. . . . The factors of ease and economy in manufacturing concrete slabs, whether to be applied vertically or horizontally, contribute to a "simplicity" which tends toward stupidity and to a barrenness which begets ugliness. Where the general form is stupid and ugly not much in the way of reclamation can be effected by proportioning of windows or application of superficial ornament. If the mass is interesting and appropriately conditioned, geographically and climatically, slight defects in detail will not too seriously challenge the taste, but an ugly mass is fatal.

Because concrete has for so long a time been poured into moulds or forms, and because of the coarseness of its ingredients, one of which was stone which could go through a two-inch ring, the earlier designers,— and I fear there were architects among them,— coupled in their minds concrete with crudity and coarseness of detail and, being dependent upon precedent and knowing not where else to look, fell upon the crude Spanish detail and broad masses of the early Spanish Missions as representative of what best might be embalmed in concrete, and so Spanish missions distorted into bungalows and cottages and palaces spread like a rash over the face of the country. . . .

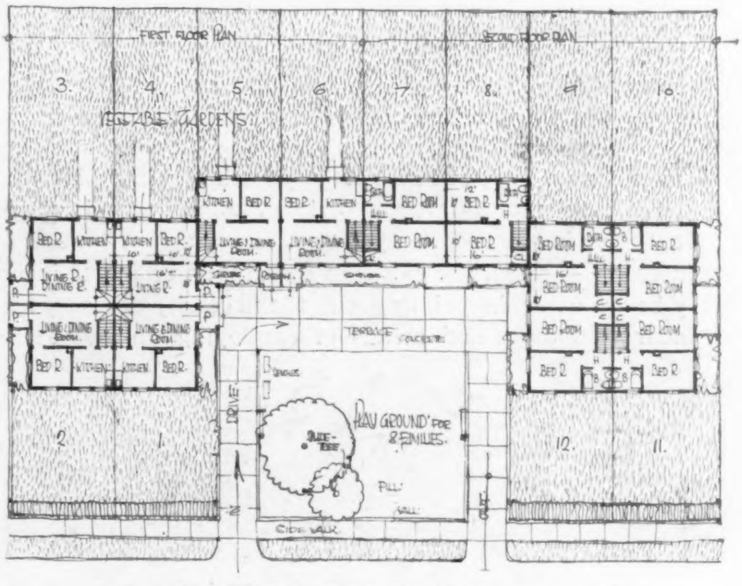
The waste entailed in the destruction of specially constructed and expensive forms has become apparent to many concrete users, and their efforts to prevent the consequent loss, especially in case of the smaller residences and the houses with which this conference is more particularly concerning itself, has introduced an element which may well call for restraint in its application. For the sake of economy, forms are used and re-used in close proximity. When such forms are not perfect in themselves and in utmost good taste, monotony in repetition becomes deadly, and woe is it to him whom cruel fate has condemned to inhabit a unit in an environment so constituted. . . .

In spite of the manifold and varied means, methods, processes, applications, manipulations, textures, surfaces and colors appertaining to the use and employment of concrete as a medium of architectural expression and embodiment, I am not certain that I should advise its sole and unlimited agency in housing the activities of any one neighborhood or community. Indeed, I am quite certain that I should not so advise; and this not altogether on the ground of a needed variety, but that there are other materials which transcend even concrete as a medium of certain desired expressions of the human spirit in the art of architecture. And I should desire to see no community curtailed of, or denied, the right and power to express the best that is in it in the materials best adapted to that expression. . . . In the matter of brick, for example, there is scale to the unit which relates the mass to human desire and experience in an intimacy possible with no other material, while in natural color and texture the range is boundless. But, even with all that, brick needs other materials in its neighborhood for contrast and variety — purple green of slate, soft white of stucco, weathered gray of timbers, with carvings and turnings, and craftsmanship which cannot be imparted by a mould however exquisitely the surface be wrought.

In connection with the Conference there was held an exhibit of concrete houses, some of which illustrated good architectural use of the material; most of the work, however, followed precedent in design associated with masonry or frame construction with stucco covering.

The illustrations herewith show one of the most

Sketch of Block for Plan Shown Below



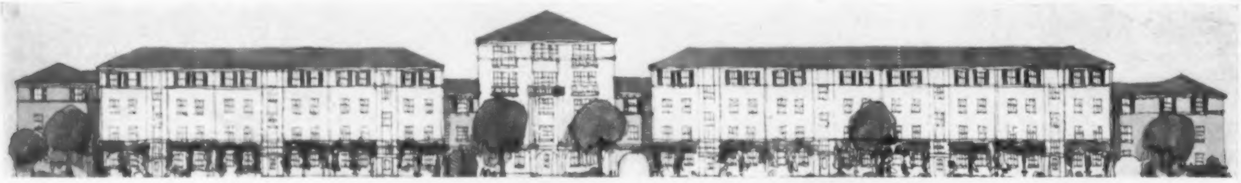
Floor Plan of Block for Twelve Families, Youngstown, Ohio
Herding & Boyd, Architects

Sketches for Proposed Apartment Buildings, Herding & Boyd, Architects

interesting exhibits in that the limitations of the material are recognized in the design, and the architectural effect secured by pleasing masses and the use of color. Many attractively rendered sketches presented various arrangements of the standardized construction employed by the architects, and the photographs of a completed development at Youngstown, Ohio, where a hilly site enabled them to achieve an element of picturesqueness, indicated the realization of much of their individual character in the completed work. In this development, comprising a total of 281 houses, there are only two types of house used, the floor plans of which are shown. The whole group illustrates the possibilities of avoiding monotony through grouping and recognition of topography, even when restricted to such a minimum in plan types.

All of the designs of the architects are intended to be carried out entirely in monolithic concrete, cast by a system which has interesting possibilities in larger housing developments where duplication of parts can be had, but with no application to individual houses, or in groups of less than fifty or seventy-five houses. The system of construction is interesting, and a few words in description of it may be of value in pointing out the necessity of standardized units and means of employing unskilled labor if low cost concrete houses are to be made a reality.

The houses are erected from large, pre-cast concrete units, one unit being sufficient for an entire side wall, one story high, of a single house, or for the entire floor of one room. These units are cast in horizontal moulds that are placed along the sides of a spur railroad track, along which the concrete mixture is carried and transferred by gravity through chutes to the moulds. All the concrete is mixed at a central point and the standardization of the house designs enables the same forms to be used continuously, so the labor of casting is very considerably reduced. The units when cast weigh from one-half to six tons each; they are loaded by means of a locomotive crane to five-ton motor trucks and transported to the place of erection, where they are handled by a movable hoist. The entire structures are of these units, including the interior partitions, with the exception of the gabled roof portion, which is built up above the second story ceiling slab, in frame with stucco surface. Also the foundation walls, 8 inches thick, are cast in place in the usual way. The exterior wall slabs are 3 inches thick with 4 inches projecting ribs, 16 inches o. c., which make provision for the necessary air space; they are also rabbeted at the ends, so that spaces are provided for sealing with grout.



Sketch Elevation of Proposed Apartment House Group, Herding & Boyd, Architects

ARCHITECTURAL & BUILDING ECONOMICS DEPARTMENT

C. STANLEY TAYLOR, *Associate Editor*

A Forecast of Building Conditions during the Coming Season

WITH the opening of the spring building season, now almost at hand, reports from various architectural, contracting and building department offices indicate that 1920 is to be a year of great activity — perhaps a record year in volume of expenditure on building enterprises of a private or semi-public nature. Undoubtedly building projects are to be carried out this year under conditions of the most unusual nature, owing not alone to high cost of materials and labor, but to the definite shortage in many classes of materials and of labor at many points throughout the country.

The building demand, as indicated at the present time, may be divided into three classes, — utility, speculative and investment. Under the utility classification come industrial buildings, such as factories and factory extensions and construction to increase transportation facilities, such as wharves, piers, and warehouses and general terminal developments at receiving, shipping and transfer points. Speculative building represents only a transitory state of expenditure in which buildings constructed to meet a known demand pass with profit to the speculative builder into the investment class. This type, as usual, will be largely limited to dwelling, apartment house, store and office building classes, although the field of speculative building is extending into the construction of small factory units in many industrial centers. Investment building will be confined principally to the provision of housing, hotels, office space and public amusement enterprises. This year will undoubtedly show the greater volume of expenditure in the remodeling of buildings of every type.

The greatest volume of construction will undoubtedly be shown in the utility and investment classes. Speculative building is curtailed, not by a shortage of building and permanent mortgage money, but to the decreased share of the financial burden which loaning sources are willing to assume. In the investment class of building there is available more money for equity financing than ever before known. In addition to the usual class of real estate investors, money is for the first time in the hands of individuals who have never had investment funds before, and who instinctively believe in improved realty as an investment. High rentals, offering the possibility of sinking fund protection against shrinkage in replacement values, present additional inducement to invest in buildings offering various classes of rentable space. In the housing field there exists not only a condition where individuals for the first time are in a financial position to own a home regardless of high cost, but a determined attempt is being made by many communities to encourage the financing and construction of homes; local housing companies are being organized and, as in the case of St. Louis, Lockport, N. Y., Hartford, Conn., and several other large industrial communities, not thousands, but from $1,000,000 to $3,000,000 has been raised to provide housing for employees.

From the viewpoint of the architect and builder great interest lies in the questions relating to the volume of business to be expected and the classes of buildings in which money will be invested during the present and following years. It is evident that the wave of building activity is to pass over the entire country, particularly in the East, South, Middle West and on the Western coast. The South, broadly speaking, is for the first time since the Civil War in a position to finance extensive building construction. High prices received for cotton and agricultural products, together with receipts from oil production, have created a vast purchasing power in Texas alone, while the Southern Atlantic States will show great building activity. Manufacturing activity, particularly in the automobile field, is booming the Middle West from Detroit to Cincinnati; in the East the great cry is for increased production and, despite unsettled conditions, textile, leather and manufacturing corporations in other commodity lines are refinancing and expanding principally for the purpose of adding to plant investment.

The classes of building in which activity may be expected are evidently as follows:

Housing, group, individual and multi-family.
Industrial buildings and terminal improvements.
Schools, public buildings, banks, hotels.
Theaters and places of public amusement.
Automotive buildings, garages, etc.
Office buildings. Store buildings, retail.

The architect, as never before, should study the building material market to keep carefully in touch with the availability of materials. It would seem that for the first time in building history the volume of business is to be limited not by the available amount of financing, but by the production capacity of the material manufacturers.

The Co-operative Method of Financing Buildings

A CAREFUL analysis of general building material costs shows that the average increase over pre-war prices was approximately 60 per cent last summer and in January of this year close to 120 per cent. Labor costs in the construction field have increased almost 100 per cent. The statement, therefore, that the cost of building construction has doubled since the period immediately before the war, is certainly conservative.

The unusual shortage of rentable space which exists in practically all cities and industrial centers is creating a demand for new buildings which must be met, regardless of the cost of building construction. The factor which has not kept pace with the general increase, however, is that of money available for building and permanent loans; in other words — general mortgage money. Loaning institutions are not willing to make loans bearing the same relation to cost of building and land as those made in the pre-war period. Where it was possible to get a first mortgage loan of from 60 to 70 per cent of the cost of land and building during the pre-war period, this is not now possible except in isolated cases where loans are made on an amortization basis. Generally speaking, appraised valuations as made by loaning interests do not take into account the increased cost of building, with the result that it is difficult to finance any type of building in a substantial manner.

Considering the pre-war period, the average valuation of land used for the building of an office building, loft building or apartment house was usually approximately 20 to 25 per cent of the cost of the building. Taking 100 per cent to represent the value of land and building during the pre-war period, we find approximately 80 per cent of this amount represents building cost. This amount having practically doubled, would bring the total building cost to 160 per cent, and, adding 20 per cent for land cost, we have approximately 180 per cent to be expended to-day in place of a 100 per cent investment as made before the war. On a liberal basis of this 100 per cent, possibly 70 per cent could be borrowed, leaving an equity of 30 per cent. To-day it is not possible to borrow over 50 per cent of the cost of land and building, leaving an equity of 50 per cent to be furnished.

Considering these percentages in actual cost terms, we find, for instance, that a loft building which cost $160,000 to build, using land worth $40,000, represented a total investment of $200,000 in the pre-war period, of which $140,000 could be obtained through a first mortgage loan, leaving an amount of $60,000 to be furnished by the owners, either in cash or through the medium of a second mortgage loan which they would arrange.

To-day the same building would cost approximately $300,000, while the value of land would still be about $40,000, as there has been no great increase in general improved realty values. The total investment necessary for the same building would therefore be $340,000, on which it would be difficult to obtain a loan of more than $170,000, or, to be liberal, possibly $200,000 could be borrowed on first mortgage. This would leave an equity of $140,000 to be supplied by the owner. Of course rentals probably three times as great as those during the pre-war period can be obtained, and the investment can be safeguarded through the establishment of a sinking fund; but conditions nevertheless demand a much greater investment on the part of the owner.

Owing to the foregoing conditions, the reason why speculative building in this class of property has been largely eliminated is quite evident, as speculative building depends extensively on financing through ordinary loaning sources. The demand for space in office and loft buildings particularly has increased so rapidly, however, that in many instances individuals and companies needing office and manufacturing space have been forced to develop methods of financing through which the provision of buildings could be made possible. Large organizations having need for extensive space have proceeded to build on their own account. Where smaller amounts of space have been required, however, co-operative financing has developed, as might naturally be expected, and a number of office and loft building projects are now being developed along these lines.

The co-operative financing of loft buildings offers interesting possibilities as the demand for this type of rentable space is rapidly increasing. There are at least three methods through which the construction of loft buildings has been made possible by the co-operation of future tenants.

Owing to land values there is of course a minimum height which must be employed to produce a loft building on an economical basis. These buildings are usually built from eight to twelve stories.

The first type of co-operative operation is that involved where one manufacturing concern wishes to use five lofts, and in order to build an eight or ten-story building several smaller organizations are brought together to assist in the financing and to use the remainder of the space.

The second type of operation is that where future tenants of about 60 per cent of the space carry out the complete financing, and lease the remaining 40 per cent of space at rentals which will offset the

overhead cost of occupancy on the part of the owning group.

The third method is what might be termed the promotion method, in the course of which a real estate operator obtains a liberal building loan and first mortgage from a number of prospective tenants in order that the space which they require may be provided, and possibly with some rental concession.

The first method of co-operative financing is comparatively simple, and involves the obtaining of a first mortgage through ordinary loaning channels. This mortgage is sometimes made more liberal than usual through its guarantee by the future tenants. The amount of money needed to provide the equity is then furnished *pro rata* in accordance with the space to be occupied. The usual method of providing the financing of the necessary equity is the formation of a stock company capitalized for an amount approximately equal to the necessary equity. This stock is sold to the prospective tenants in ratio to the amount of space which each will occupy, and carries with it the occupancy privilege.

After the building is constructed a liberal estimate is made of the cost of maintenance, including interest, taxes and general maintenance cost. This annual cost is then apportioned according to the amount of stock held by each tenant, and the amount necessary is paid in the form of an owner's rental. At the end of each year this amount is adjusted, refund being made if there is a surplus, or an assessment, if additional funds are needed.

The second method of co-operative financing which involves the use of about 60 per cent of the rentable space by the owners, leaving 40 per cent of space to be rented, is somewhat more involved, but usually offers better financial inducement. In this type of financing a liberal first mortgage is obtained and prospective tenants of 60 per cent of the rentable space furnish the entire amount of money necessary to construct the building and purchase the land. The method of managing this building varies somewhat, but is usually on the following basis:

Owning tenants occupy an amount of space in proportion to investment up to a total of 60 per cent of the available space. The balance of space is rented to outside concerns at the highest rentals obtainable, usually on leases of ten years. The cost of carrying the building is estimated, and from this amount the income from rentable space is deducted, leaving an annual amount which is apportioned as an owner's rental among the owning tenants. This amount is, of course, subject to refund or assessment, in accordance with actual figures resulting from the operation each year.

The benefit of this method of financing is evident, as advantage can be taken of the shortage of rentable space to obtain unusually high rentals for the 40 per cent of rentable space which is leased to non-owning tenants. The profit involved in renting this space is a reduction of owner's rental, and the reduction of rental cost to the owning tenants, will usually be found to be a high percentage on the actual equity investment.

At least two buildings have come to the attention of the writer in which the speculative builder has made use of the need for loft building space as a means to obtain high percentage financing of the operation. In one instance the builder has erected a ten-story loft building, each loft being leased to an individual tenant. The actual cost of this building with the land was approximately $450,000. The first mortgage and building loan was approximately 80 per cent of this amount, being $360,000. This first mortgage was provided by the ten tenants, each advancing $36,000. The leases made with these tenants called for a square foot rental slightly under the prevailing market price, and an agreement was made by which the first mortgage is reduced through annual payments of 5 per cent of the principal until it has been reduced to approximately 50 per cent of the total cost of land and building. In this case, through assisting in the financing, the tenants were enabled to obtain rentable space which was not available otherwise.

One or two very large loft building projects are now under way in New York City for the clothing trades in which co-operative financing has been made the basis of providing first mortgage loans.

The co-operative financing of office buildings and apartment houses offers a considerably more involved problem which is, however, of interest, and will be given consideration in this department within the next two or three months. Several methods of co-operative financing of apartment houses have been attempted, some of which have proven unsuccessful. Following one system, however, a number of apartment houses have been built in New York City involving features of actual ownership of apartment units through investment and the payment of owner's rental. The actual investment and income figures on several of these buildings are being obtained and will be presented in detail for the guidance of those who are interested in financing apartment houses along the logical lines of co-operative ownership. In the field of office building construction, co-operative financing is still in the experimental stage; but one or two buildings now under construction offer interesting possibilities, and details will be presented as soon as available.

Financing Buildings on Leasehold Property

THE acquirement of extensive land holdings in important business districts, particularly by large estates and by individuals for investment purpose, has created a condition where this land, while not on the market for sale, is made available for building purposes through the medium of the long-term lease. Such leases are usually negotiated either for a term of ninety-nine years or for two or three consecutive terms of twenty-one years each. The basis of leasing usually involves the payment of all taxes and interest by the lessee, together with an annual amount which represents approximately 5 per cent return on the investment of the owner.

The financing of buildings on leasehold property is naturally more difficult than ordinary financing, where land and building are under one ownership. This is particularly true in the mortgage market to-day, where the only consideration for collateral is the actual value of the building, and there is available through direct channels practically no money for such loans.

In the principal cities of the East and Middle West, however, several buildings on leasehold property have been financed during the past year through the medium of first mortgage leasehold bonds, which have been sold directly to the public. It is not usually possible to finance more than 60 per cent of the cost of the building, and the building must be in the investment class, such as an office building or hotel.

Taking as an example a $4,000,000 office, theater and store building which has recently been promoted in a Western city, the method of financing the first mortgage has been as follows:

After the plans and specifications had been worked out, showing that the cost of the building would be approximately $4,000,000, the first step taken by the owner was to deposit with a trust company securities covering the equity of 40 per cent of the cost, or $1,600,000. This was done after an investment security company had agreed to underwrite 60 per cent of the amount of this building, or an amount of $2,400,000, and the deposit of 40 per cent by the owner was for the purpose of guaranteeing to the public that this building operation would be carried out when the total bond issue had been sold. This amount of $2,400,000 was issued in the form of 6 per cent first mortgage leasehold bonds, due serially beginning one year after completion of the construction of the building, to the amount of $120,000 a year, or 5 per cent annual return of principal. In this manner over a period of twenty years the entire issue of bonds will be redeemed. The bonds were placed on the market at face value in denominations of $500 and $1,000, to yield an annual interest of 6 per cent. These bonds were secured by a first mortgage lien on the leasehold and building under construction. No value was attached to the leasehold, the issue of bonds representing 60 per cent of the cost of the building only, which is the customary method.

It was estimated that after the payment of taxes the net annual earning of this building would be $500,000, — an amount sufficient to cover all interest payments and annual bond retirement.

Another interesting example is a large factory which was constructed for the purpose of renting for light manufacturing. The estimated cost of this building was $1,000,000, and the bond issue was for $600,000, in denominations of $100, $500 and $1,000, paying an interest of 7 per cent. The bond issue was secured by first mortgage on the leasehold property and the fireproof brick and concrete building. In this case the completion of the building through the provision of the equity by the owner was guaranteed through a trustee by assurity bond. The building was in the investment class, being constructed to provide rental space for light manufacturing, which was greatly in demand in that district, and a conservative estimate showed an earning capacity of approximately $130,000 a year. In this case the bonds mature serially in increasing annual amounts, starting at $30,000 in 1920 and increasing to $48,000 in 1928, the balance of about $290,000 being due in 1929, this refunding the entire principal.

From the foregoing figures it is evident that the principal involved in the financing of buildings constructed on leasehold property involves generally the provision through a bond issue of 60 per cent of the cost of the building. The investment value of the building after paying taxes and land rental must be such that all interest charges can be met, together with the payment of matured bonds. Thus, over a period varying from ten to twenty years, 60 per cent of the cost of the building is refunded from the rental income, leaving at the end of this period a building in which the investment has been reduced to 40 per cent.

The leasehold building operation offers the possibility of creating rentable space on a much lower actual investment, as the purchase of land is unnecessary, the land element in the operation being represented only by an annual rental and tax charge. In many instances leaseholds of this nature increase considerably in value, and it is often found that at the end of the period of normal value of the building, the leasehold itself represents collateral of high value.

Appraising the Value of Lots of Unusual Dimensions

With the expanding interests of the architectural profession, there are new subjects coming to the architect's attention on which information is desirable. In the field of investment building particularly, a working knowledge of real estate practices is invaluable. It is to serve in this capacity that the following article has been prepared, in which are brought together for reference the most usual means for determining the value of parcels of land that are special in character, due to their location or size. — EDITOR.

IN many sections of the United States the next year will show unusual activity in the purchase of land for building purposes. The average buyer of lots for building will be a prospective home builder or investment builder. One of the important questions which this class of realty buyer must face is that of purchasing land which is within economic limitations of the building investment which he proposes to make. Normally, in the various districts where building is contemplated, vacant land has a well defined lot value. In some cases this value is based on front footage, but in many instances, particularly in New York City, the land value is estimated per lot 20 or 25 by 100 feet.

In buying and in selling city lots a puzzling question arises when a lot is either shorter or deeper than 100 feet, or where it is a corner lot. There are several definite methods of arriving at the value of lots of unusual dimensions or location, and it might be of interest to prospective real estate buyers to have these methods of computing values brought together for reference purposes. The more important and most generally used rules of this type are as follows:

The first rule to be given is known as the Hoffman-Neill Rule and is a calculation carried out to show the proportion in value of each foot in depth of any lot from 1 foot to 100 feet. According to Mr. Lawson Purdy, who was for eleven years President of the Department of Taxes and Assessments of the City of New York, this rule was originally developed by Judge Murray Hoffman about fifty years ago and was known as the Hoffman Rule, being a simple deduction or declaration that the front half of a lot is worth two-thirds of the value of the full lot. Later, the Real Estate Editor of the *New York Evening Mail*, Henry Harmon Neill, carefully calculated the proportions resulting from the application of a rule that, taking 100 feet as a basis of unit of depth, the value for the first 50 feet of this depth is two-thirds of the whole. This resulted in the Hoffman-Neill Rule as follows, the 100-foot figure representing the appraised valuation of a full lot:

Hoffman-Neill Rule

Feet	P. C.	Feet	P. C.	Feet	P. C.	Feet	P. C.	Feet	P. C.
1	0676	21	4012	41	5934	61	7492	81	8837
2	1014	22	4123	42	6018	62	7563	82	8901
3	1286	23	4232	43	6102	63	7634	83	8964
4	1520	24	4339	44	6185	64	7704	84	9027
5	1732	25	4444	45	6267	65	7774	85	9090
6	1929	26	4548	46	6348	66	7843	86	9153
7	2112	27	4650	47	6429	67	7912	87	9216
8	2282	28	4751	48	6509	68	7981	88	9278
9	2443	29	4850	49	6588	69	8049	89	9340
10	2598	30	4947	50	6667	70	8117	90	9401
11	2748	31	5042	51	6745	71	8185	91	9462
12	2893	32	5136	52	6822	72	8251	92	9523
13	3033	33	5229	53	6899	73	8317	93	9583
14	3168	34	5321	54	6975	74	8383	94	9643
15	3298	35	5412	55	7051	75	8449	95	9703
16	3424	36	5501	56	7126	76	8514	96	9763
17	3547	37	5589	57	7201	77	8579	97	9823
18	3667	38	5676	58	7275	78	8644	98	9882
19	3784	39	5763	59	7348	79	8709	99	9941
20	3899	40	5849	60	7420	80	8773	100	10000

For calculating the value of front inside lots there is also the Lindsay-Bernard Rule as follows in which a lot 150 feet deep equals $100 as a unit value. In this rule is shown the percentage of valuation for lots of varying depths up to 200 feet.

Depth from Front	Per Cent of Value	Depth from Front	Per Cent of Value
5	9.	90	84.2
10	15.	95	86.2
15	21.	100	88.
20	27.	105	89.6
25	33.	110	91.1
30	38.5	115	92.5
35	44.	120	93.8
40	49.	125	95.
45	54.	130	96.1
50	58.5	135	97.2
55	63.	140	98.2
60	67.	145	99.2
65	70.6	150	100.
70	73.9		
75	76.9	175	103.
80	79.6	200	105.
85	82.		

The Valuation of Corner Lots

In discussing the question of appraising corner lots, Mr. Purdy states he does not believe that any rule having universal application has been devised. While the Hoffman-Neill Rule is of very general value for the determination of the value of short lots, all appraisers are well aware that it can generally be applied only to plots of land which are of usable shape and size. The same principle applies to any rule for the determination of the value of corner lots. Moreover, while a corner 100 feet

square in one ownership may be increased in value as to all of its area by reason of its corner position, it is generally true that the corner influence does not extend beyond a permanent structure erected on the corner, even though that structure be only 25 feet wide.

While no rule should bind the judgment of an intelligent assessor, the study of rules may be of great aid to judgment. For the purpose of consideration and discussion the more important part of the rules formulated by Mr. W. A. Somers for the determination of the value of corner lots is given, also the simple rule presented by Mr. Alfred D. Bernard, Special Assessor to the Appeal Tax Court of Baltimore, as set forth in his book, "Some Principles and Problems of Real Estate Valuation."

The Somers Rule

For the determination of the increment of value attaching to a plot of land 100 by 100 feet, on a corner over what it would be worth if it were an inside plot, Mr. Somers has constructed a curve. When this curve is laid down upon a sheet ruled in squares representing one foot, every variation of value may be determined with accuracy. As a practical matter, ten variations of the rule will ordinarily suffice. The principle upon which Mr. Somers' curve is based is the fact that a corner is more valuable as compared with an inside lot when streets of equal value intersect than when a street is intersected by one of less value.

Corner lots 100 by 100 are increased above the value of inside lots. The greatest increase is when two streets of equal value intersect each other, and the smallest increase is that due to a blind alley which amounts only to an easement of light and air. The following table shows the percentage of increase enjoyed by a corner lot determined by the relative value of the intersecting street to the best street when the best street has a value of $1,000 a foot. The corner 100 by 100 is increased as follows:

Side Street Value	Per Cent	Side Street Value	Per Cent
0	6.	$600	25.2
$100	8.3	700	30.2
200	11.1	800	36.2
300	14.1	900	43.2
400	17.3	1000	51.
500	21.		

When the aggregate increase of a corner lot 100 by 100 has been determined from the previous table, the value of a lot of any width 100 feet deep fronting on the best street may be ascertained from the curve of value. The following table shows the percentage of the total corner increment for a lot 100 by 100 which attaches to various parts of the lot. Thus 5 by 100 on the corner is increased by 23.5 per cent of the total increment for the whole lot 100 by 100 as shown by preceding table:

Feet	Per Cent	Feet	Per Cent
5	23.5	55	92.
10	38.5	60	94.
15	50.4	65	95.5
20	59.3	70	97.
25	67.4	75	97.9
30	73.5	80	98.75
35	78.8	85	99.2
40	83.	90	99.5
45	86.5	95	99.8
50	89.4	100	100.

Mr. Bernard explains the valuation of corners as follows:

"In our work in Baltimore City we studied the situation carefully and tried out various theories on hundreds of known sales, and we found that as long as we tried to fix a rule to measure the extent of corner influence, we could not reach a satisfactory rule of value which could be proven; but if we fixed the extent of corner influence by the normal utility of the corner and recognized the property lines of individual owners, we could reach a *minimum* value for a corner lot which we could prove almost invariably.

"We found that unless the corner lot was a small one, that ordinarily corner influence did not extend beyond the actual corner holding, and if the lot itself was available for the best utility of the zone, we were sure of it; and if any additional value attached to the adjoining inside lot, it was potential and speculative, the exception being where we were appraising lots on low valued side streets working up to high valued main streets.

"Therefore, to get the value of a corner lot in the business district of a given city, we proposed this rule, which because of the co-operation of my co-worker in the Department of Assessment and Review of Baltimore, we have called the Lindsay-Bernard corner lot rule for business districts.

"First, reduce the lot to its logical front, which will be on the highest valued street, whether the lot actually faces it or sides on it.

"Second, find its value as an inside lot on the main street.

"Third, find its value as an inside lot on the side street, producing it on the Lindsay-Bernard Rule: the sum will be the minimum value for the corner.

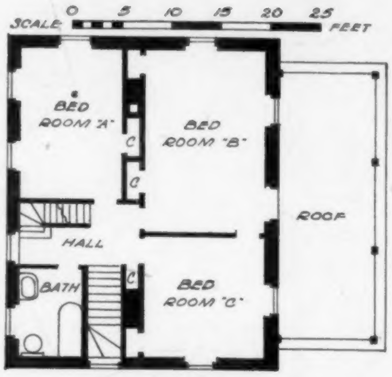
"Fourth, add all the minor factors of value, which suggest themselves to an intelligent appraiser.

"This is as far as we can go, and we believe we have gone the limit."

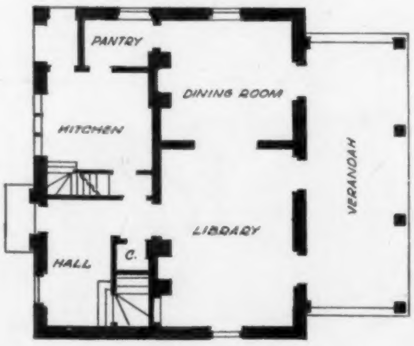
A Small Brick House at Germantown, Pa.

EDMUND B. GILCHRIST, ARCHITECT

ENTRANCE FRONT



SECOND FLOOR PLAN



FIRST FLOOR PLAN

VIEW FROM GARDEN

EDITORIAL COMMENT

WHAT is a competition? The architectural profession is vitally interested in a correct answer to this question. The American Institute of Architects has established a certain code which defines, more or less clearly, the status of competition in architectural problems, but apparently the conditions are not entirely clear in the minds of the members of the profession.

In the old days one of the first steps in solving an important problem was to invite certain architects to participate in a competition. In some instances all were paid and in others only the winner received compensation. In recent years, however, it has developed that the owner or a building operator would approach an architect and lay before him his building problem. The architect takes for granted that he is the only one thus approached. He will prepare the drawings and submit them to the owner, only to find that other architects have also submitted their drawings. Judicial authority has decided that this constitutes an unauthorized competition. Men have submitted sketches under these conditions who would under no consideration enter a competition.

What can be done to protect the architect against undeserved censure? The architect is called in conference with an owner. Theoretically he must ask the owner if any conferences have been held with other architects. If so, he must decline to confer further unless the owner first approaches the American Institute of Architects, asking that a competition be arranged.

Obviously the first architect approached would receive a negative answer to his inquiry. The next man might not be so ethical, and would refrain from asking questions. Under the recent decision the first man is as culpable as the second, although, in reality, the second man is the only one to enter in competition.

An owner asks an architect to prepare sketches for a project. Other architects hear of it and offer sketches. The owner is willing to receive suggestions so long as he is under no liability therefor. He is determined that if the construction proceeds, the architect he first approached shall execute the commission. Is this a competition? Is the first architect in any degree to be criticized for unprofessional conduct? Such conditions have existed. It is obviously unfair to the architectural profession and some changes should be made in any code which does not afford justice and equity. A good, healthy competition is sometimes desirable, but decisions as in the cases noted detract from the strength of the Institute and the loyalty of its members.

The Code of Ethics of the American Institute is a heritage of the days when the profession was individualistic. Building operations were carried on largely by individuals rather than by corporations. Each architect was identified, more or less closely, with certain clients. What is more natural under these conditions than that the profession should establish a code to prevent the unprincipled practice of "stealing a client" from another architect.

Nowadays all the major work is done by corporations or trusts composed of a number of men. The individual, both in real estate operations and in architecture, is not so prominent. What is more natural than that several directors of a trust should have friends in the profession and individually approach them for suggestions? If this is competition, the code should be amended.

A competition was recently held which was not disapproved by the American Institute and which was held in accordance with its rules. The building referred to was already designed from a structural standpoint by an engineer, and was final as to location of columns, window spacing, floor heights, grades, etc. No latitude whatever was given to the architect to do anything except make an outside to fit the proposed building. Yet the competitors were invited to participate as architects.

If the tendency of modern times is to develop architects as dressmakers for engineer's frames, then the architect might as well give up his profession and strive to become an engineer in the newly accepted sense. If the architect values his profession, its ethics, its moral standards, its opportunities only to the extent of getting a "job," it might be for the best to give up architecture. He must have the fortitude and courage necessary to refuse to be made a mere draftsman unless he is prepared to acknowledge that his best work is done under the direction of some more capable executive.

Every architect, without doubt, remembers the attitude taken by the Government toward the architectural profession in the early war period, and how he was distinctly sidetracked by any one who called himself an engineer. If this condition is sought after by the architects as a whole, there is no better way to tell the Government and the business world that architecture is no longer an able, efficient, business-like profession than by assisting in just such problems as outlined above.

The profession has been criticized from the standpoint of its unbusiness-like methods, its over-accentuation of art and the ethical side. Recent events would seem to give the criticism weight.

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In the past three years the population of Tulsa has jumped from 28,240 to nearly 79,000!

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Tulsa insists that its new buildings be up to the minute—thoroughly modern in every respect. Thus it is that the buildings shown here, as well as most of the other prominent buildings in this live city, are covered with Barret Specification Roofs.

Known Costs and Guaranteed Service

The Barrett Specification represents the modern way of buying a roof.

When you write the Barrett Specification into your building plans, you definitely eliminate all uncertainty connected with your roofing problems. You deal with *known costs* and *guaranteed service.*

For we are ready to *guarantee* Barrett Specification Roofs to give 20 *years of service,* free from maintenance costs of any kind.

This guaranty, which is in the form of a Surety Bond issued by the well-known U. S. Fidelity & Guaranty Company, of Baltimore, costs you absolutely nothing.

It is obtainable on all roofs of 50 squares or over, in towns of 25,000 or more, *and in smaller places where our Inspection Service is available.* Our only stipulation is that the Barrett Specification dated May 1, 1916, be strictly followed and that the roofing contractor shall be approved by us.

The Barrett Company

New York	Bethlehem	Elizabeth	Buffalo	Baltimore
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THE BARRETT COMPANY, Limited: Montreal Toronto Winnipeg Vancouver St. John, N. B. Halifax, N. S. Sydney, N. S.

Above is the Cosden Building, Tulsa, Okla., covered by a Barrett 20-year Specification Roof. Arch: Henry F. Hoit, Kansas City. Gen. Cont.: G. A. Fuller Construction Co., N. Y. Roof Cont.: Standard Roofing & Metal Co., Tulsa, Okla.

At right, Ketcnum Hotel, Tulsa, Okla. Arch.: Geo. Winkler, Tulsa, Okla. General Cont.: Van Horn & Brickner, Tulsa, Okla. Roof Cont.: Builders' Supply Co., Tulsa, Okla.

Below "Mid-Co" Bldg. (Mid Continent Oil & Gas Co), Tulsa, Okla. Arch.: Schumacher & Atkinson, Tulsa, Okla. Gen. Cont.: Hoffman Bros., Kansas City. Roof Cont.: Builders' Supply Co., Tulsa, Okla.

Below: S. H. Kress Building covered with a Barrett 20-Year Specification Roof. Roof Cont.: Tulsa Roofing Co., Tulsa, Okla.

At the left: Kennedy Building, Tulsa, Okla. Architect and Gen. Cont.: A. W. Black & Son, St. Louis. Roof Cont.: Builders' Supply Co., Tulsa, Okla.

Below: R. M. McFarlin Building, Tulsa, Okla. Arch.: Geo. Winkler, Tulsa, Gen. Cont.: Van Horn & Brickner, Tulsa. Roof Cont.: Builders' Supply Co., Tulsa.

Manufacturers' Catalogs and Business Announcements

CATALOG REVIEWS

The publications listed below have been recently prepared by building material and equipment manufacturers. Unless otherwise stated, copies can be obtained without charge by addressing the concerns direct at the addresses given. Mention of THE FORUM will be appreciated.

THE MATHEWS MANUFACTURING COMPANY, Cleveland, Ohio.
"Garden Craft," Catalog of Outdoor Furniture (10 x 13½ ins.). 116 pp.

The output of the above company is thoroughly represented in the pages of this large book. There are well over two hundred illustrations of trellege in its varied forms so generally recognized in the English garden of to-day. Many of the designs shown are replicas of English and French pieces, and others are from architects' sketches or by designers on the Mathews staff. Although this book serves to show what the Mathews Company is capable of accomplishing in special work, a large number of these products may be had on receipt of order. It will be noticed that large and elaborate commissions, such as swimming pool pergolas or temples, are carried out as well as the simple garden bench, table or gate.

THE STANLEY WORKS, New Britain, Conn.
"8 Garages and Their Stanley Garage Hardware" (3½ x 6¼ ins.). 32 pp.

Although of diminutive size, this booklet furnishes the basic facts of garage equipment to a considerable extent. Starting with brief recommendations for the layout of the structure, it is followed by eight photographic examples of varying design, both as to exterior and plan. Figures are given on the floor plans with the convenient and proper location of working gear, and the comments on each type of garage are followed by quantity schedules of Stanley hardware. The contents close with a summary on hinges, butts, latches, bolts and the well known door holder.

AMERICAN FACE BRICK ASSOCIATION, 110 South Dearborn street, Chicago, Ill.
"The Story of Brick" (7 x 9 ins.). 56 pp.

With the issuing of this booklet, a treatise on the history, manufacture and use of brick is available to the building trades and layman that will familiarize each with their possibilities in case of their contemplated use. To any one who is working in this building material a fund of data is contained here in handy form. The real mission of this book is an appeal to prospective builders to consider face brick as a medium in which to carry out their chosen designs for a residence. Under a section devoted to home building there are the following headings: "On Financing Home Building," "Handling the Mortgage," "Building and Loan Associations," etc. Considerable space is given to the exceptional merits, technical practices and artistic qualities of face brick. Among the fine illustrations and diagrams appear time honored structures of brick and beautiful dwellings of to-day wrought with the same charm that is so irresistible.

ANNOUNCEMENTS

Mr. Erick S. Anderson announces the opening of an office for the practice of architecture at Room 709, Peoples Savings & Trust Building, Akron, Ohio. Manufacturers' catalogs and samples requested.

Mr. Flournoy G. Hagan announces the opening of an office in the First National Bank Building, Paris, Ky., for the practice of architecture and structural engineering, the title of the firm to remain as Wm. K. Hagan & Son.

Mr. Charles S. Keefe announces that he has severed his connection with the firm of Alfred Hopkins and Charles S. Keefe and is opening an independent office for the practice of architecture at 368 Lexington avenue, New York, N. Y.

Mr. William Drago and Mr. L. Milton King, associate architects, announce the opening of an office for the practice of architecture at 217-A De Siard street, Monroe, La. Manufacturers' catalogs and samples requested.

Messrs. Davenport and Williams, delineators, announce their association and opening of offices in the Castle Hall Building, Indianapolis, Ind., for the practice of architectural rendering.

Mr. Joseph Hudnut, architect, announces the opening of an office for the practice of architecture at 41 Union square, New York, N. Y.

Mr. Robert J. O'Neill announces the opening of his office for the practice of architecture at 1147 Connecticut avenue, N. W., Washington, D. C. Manufacturers' catalogs and samples requested.

Mr. Melvin T. King, of Russell & King, Architects, has secured the services of Fred B. O'Connor as chief draftsman and office manager in the Syracuse office.

Mr. O'Connor has been special architectural designer for New York State for the past fifteen years and has personally designed the developments at Sing Sing and Wingdale Prisons; Cornell Drill Hall, Ithaca; numerous State Hospitals and Armories throughout New York State.